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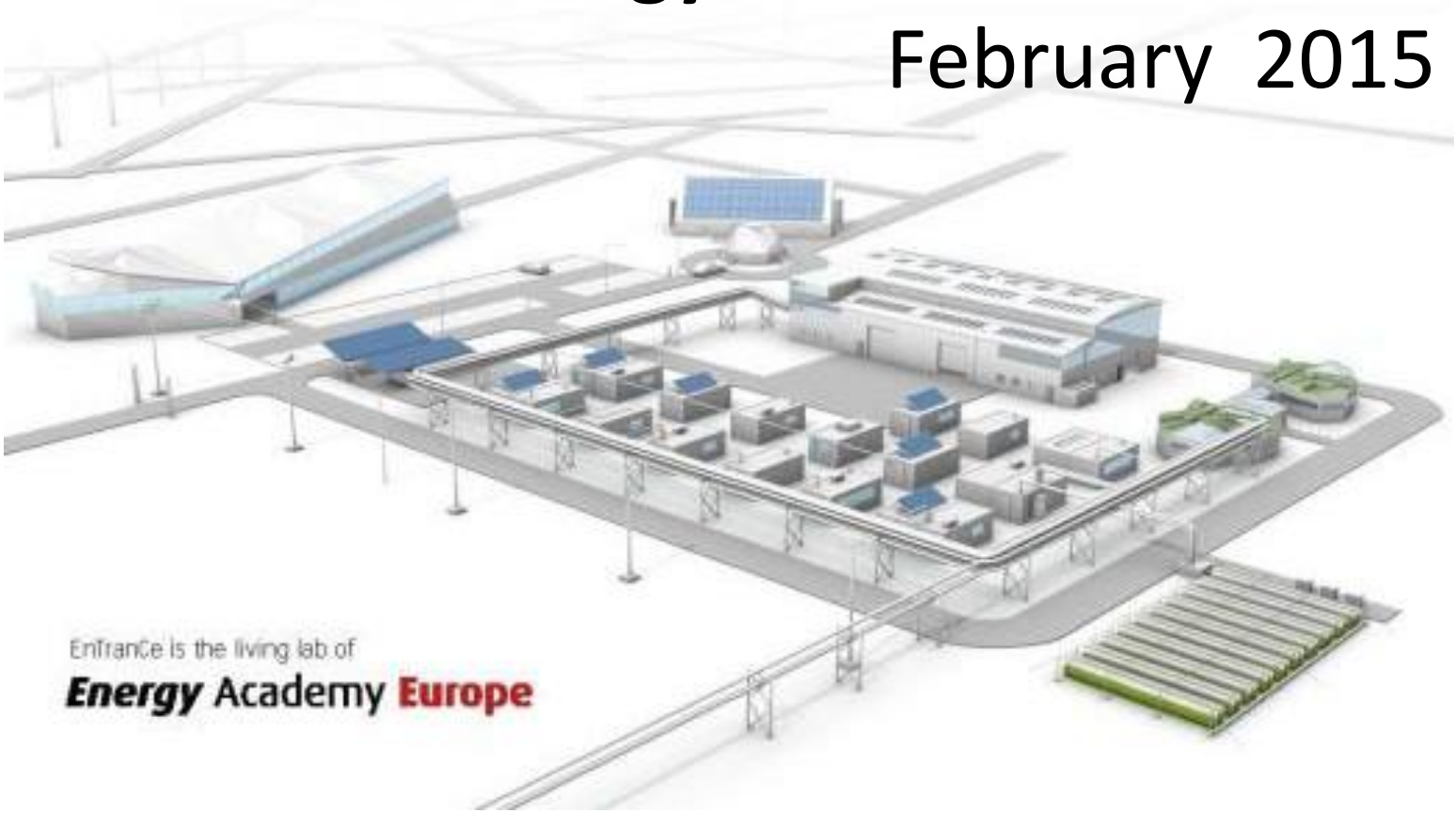
Renewable Energy in The Netherlands
February 2015



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This analyses contains information of various sources and own analyses, including various estimates.

Readers are encouraged to add, to improve the quality of the information provided.

February 2015

In a Nutshell

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- Electricity production by Solar Energy was 65% higher than in February 2014
- Electricity production by wind energy was 40% lower than in February 2014
- A capacity of 70 MW of wind and 30 MW of solar PV was added in February
- Power imports were lower, while gas exports increased compared to last year
- Due to low availability of wind and reduced utilization of biomass, the percentage of renewable energy was (only) 3.3%
- Gas demand was limited due to high temperatures, although higher than last year because of increased utilization of gas in power generation.
- In February 2015, CO2 emissions were 5% higher compared to last year

Content

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- Monthly profiles
- Monthly data
- Hourly data
- Miscellaneous

SELECTED ENERGY DATA FROM JANUARY

Final Energy Demand

February 2015

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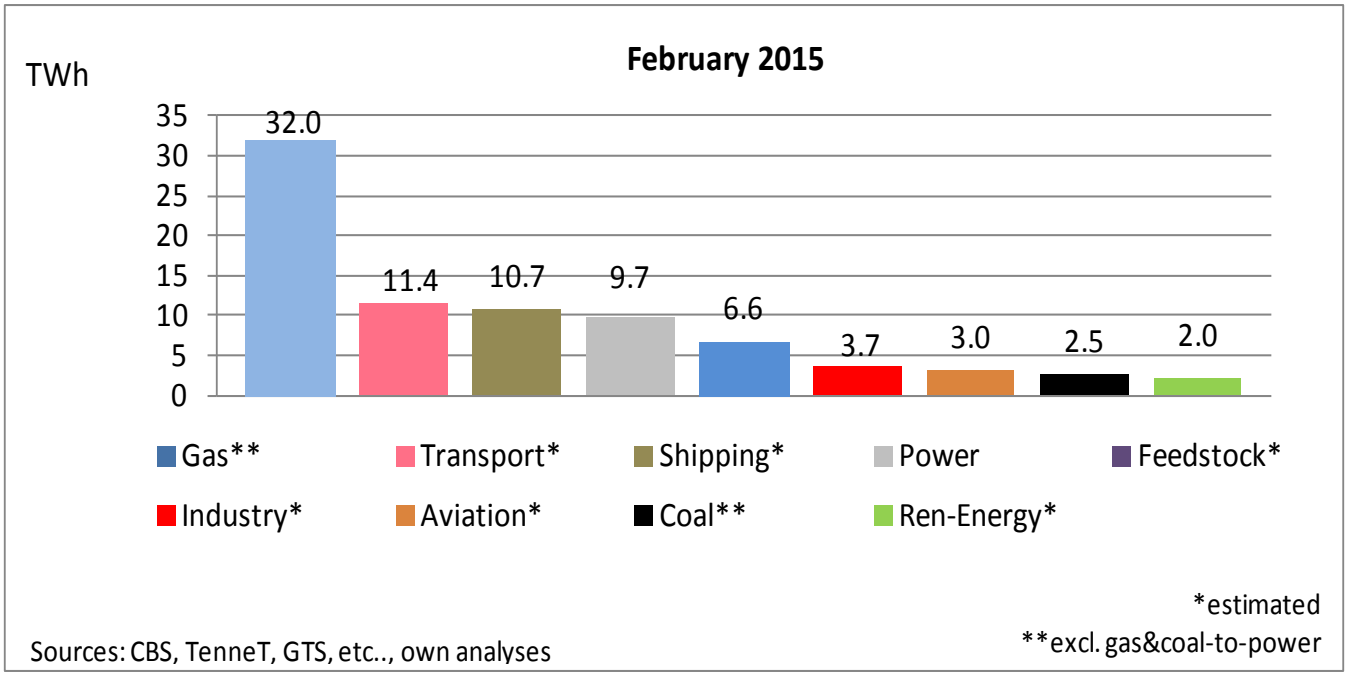

Energy is used for many different purposes. In February, the most important applications were heating/gas (32 TWh) and transport (25.1TWh). Final energy demand, including sources that do not contribute to national CO2 targets, was 80 TWh. Renewables are given by comparison.

Final Energy Demand

February 2015

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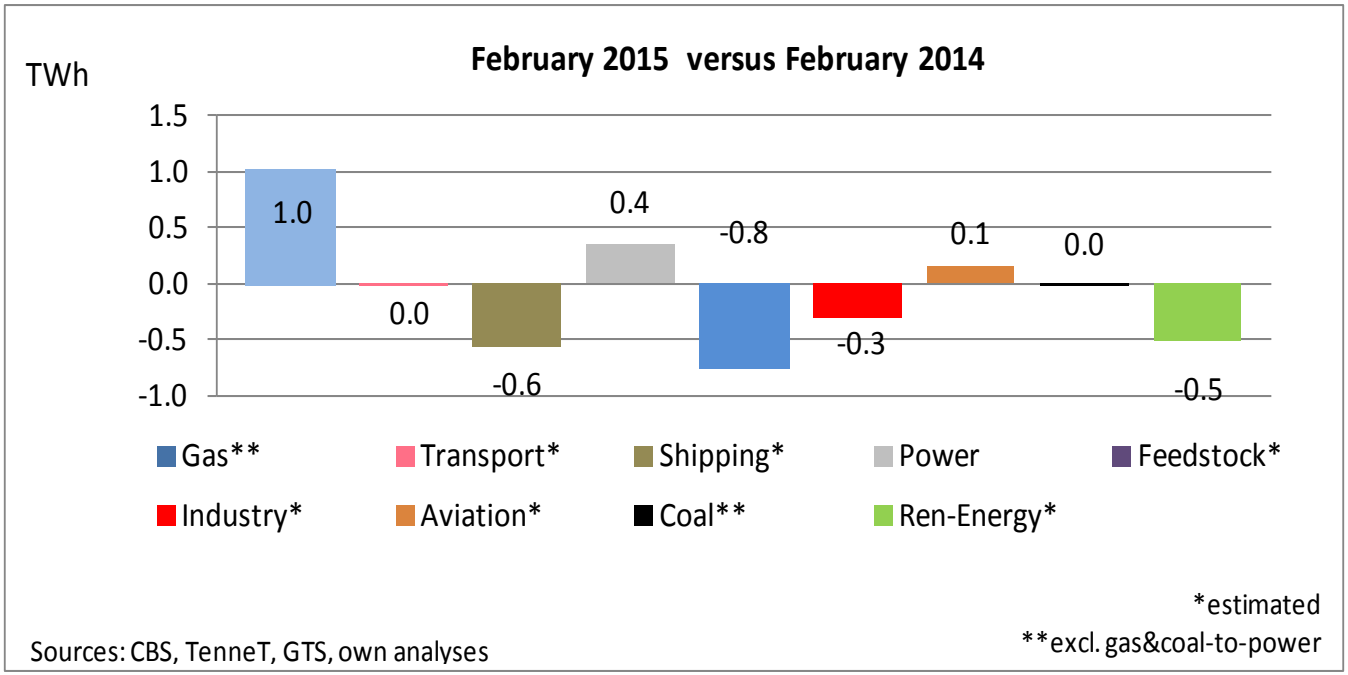

In February 2015, gas consumption was higher than last year, while energy used for bunkering and feedstock is estimated to be lower. Due to low wind and biomass, renewable energy production was lower than in 2014.

CO2 Emissions
February 2015

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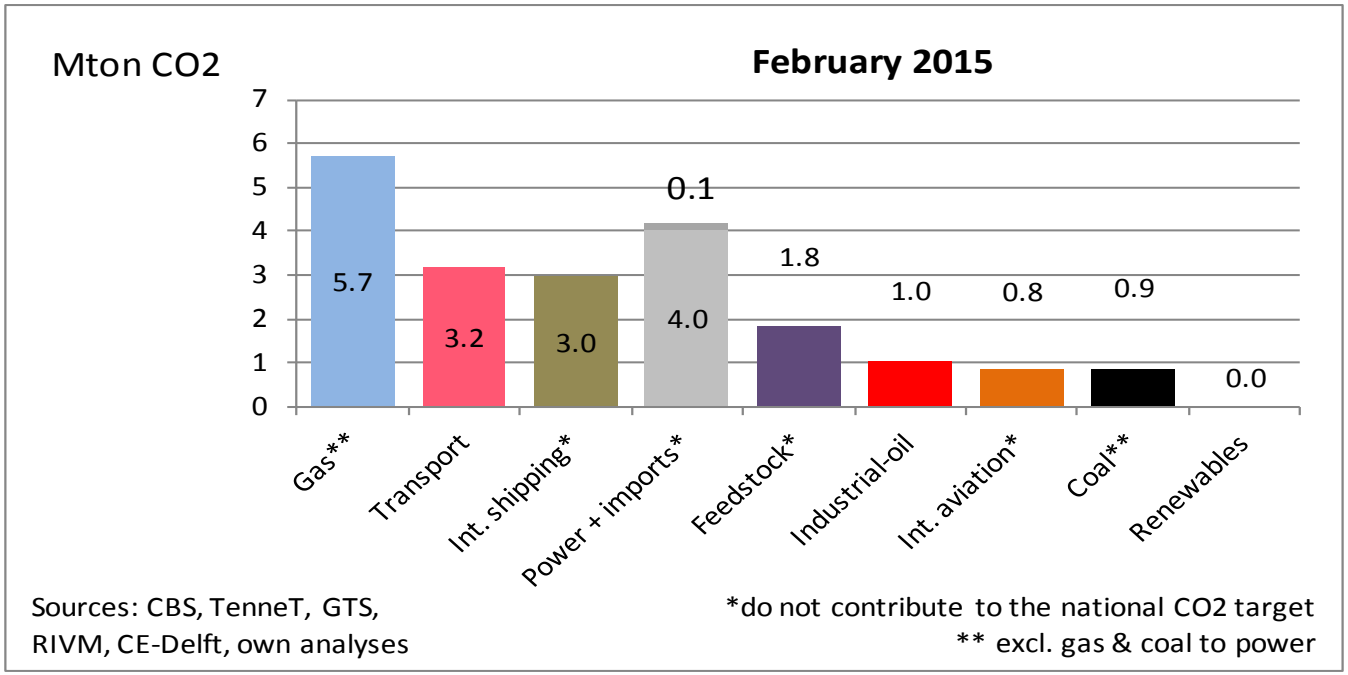

The national CO2 emission in February 2015, excluding power imports, feedstock and international shipping & aviation, has been estimated at 14,8 Mton. This was 5% higher than in February 2014 .Main reason is more national power production, due to more coal and less imports.

Power Generation Capacity February 2015

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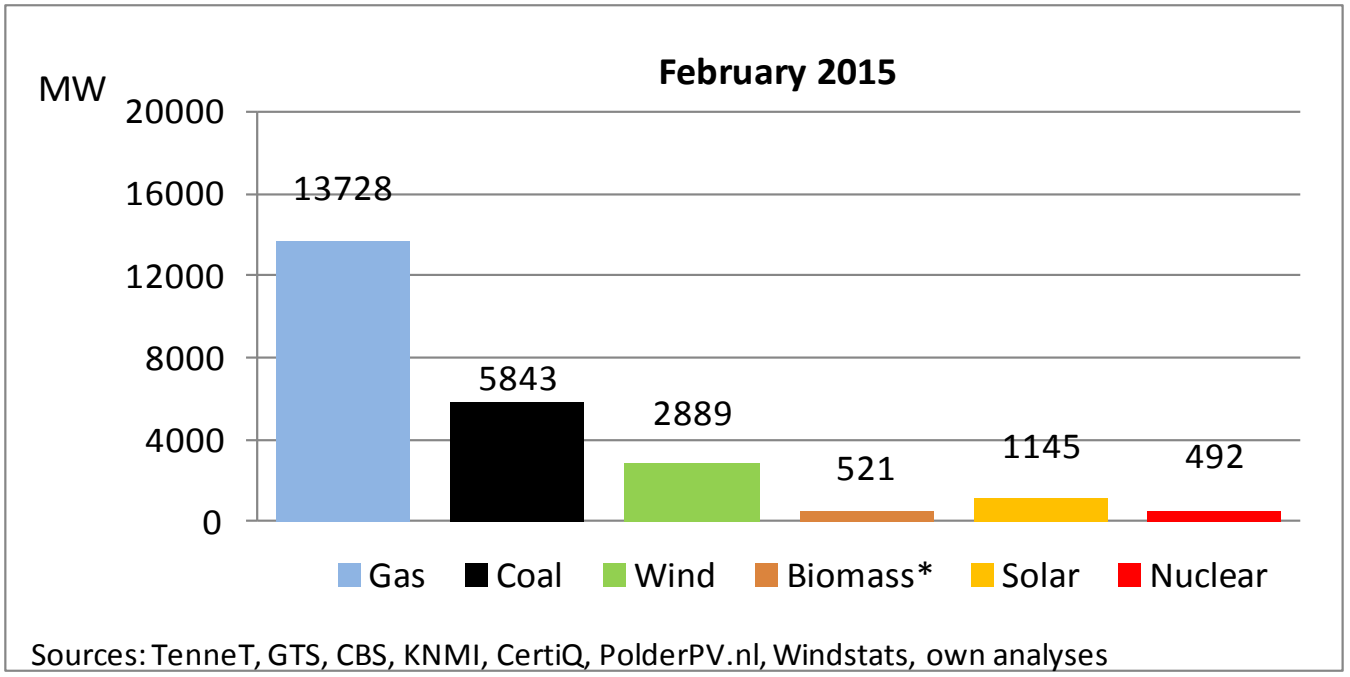

Sources: TenneT, GTS, CBS, KNMI, CertiQ, PolderPV.nl, Windstats, own analyses

Wind power increased by 70 MW last month. The estimated increase in solar energy was 30 MW. No further changes.

Power Supplies

February 2015

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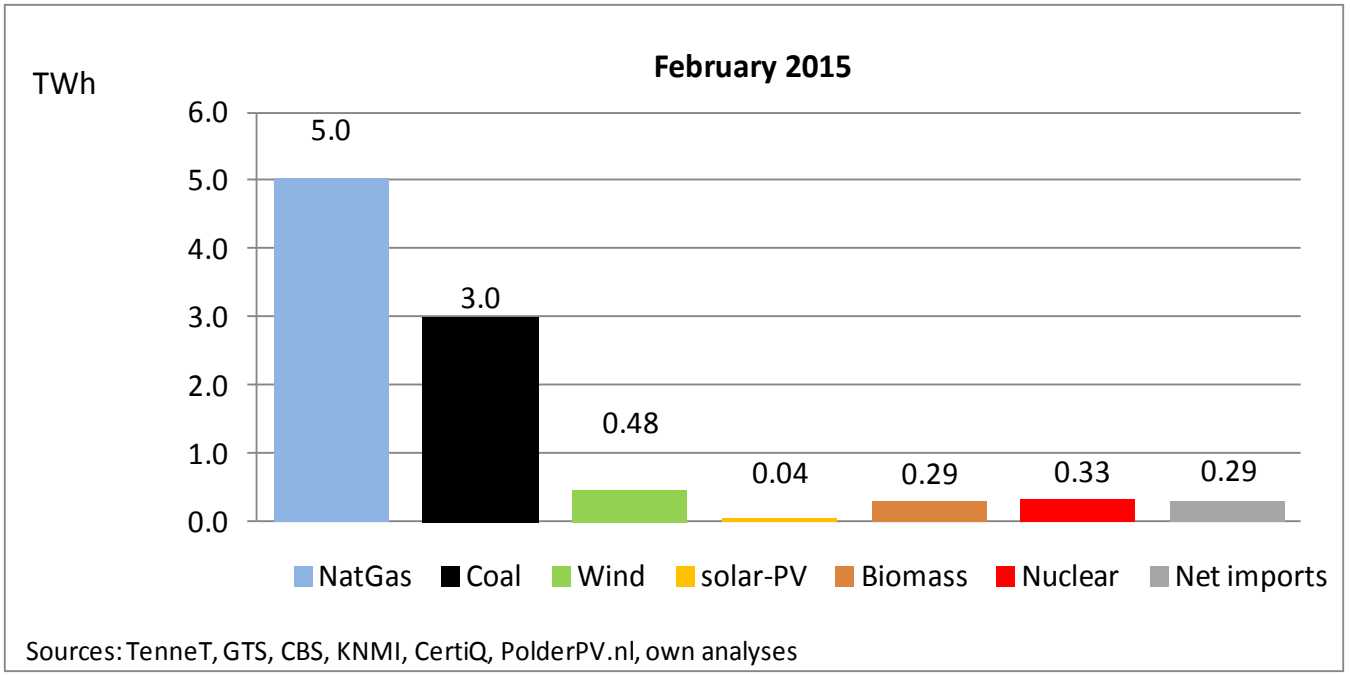

In February 2015, power consumption in 2014 was 9.7 TWh, 4% higher than in February 2014. Net imports decreased by 80%. Compared to previous year. Coal-fired and Gas-fired generation increased significantly. In February, the average contribution from renewables to the power supplies was only 8%.

SELECTED MONTHLY PROFILES

(using daily data)

Gas and Power Demand February 2015

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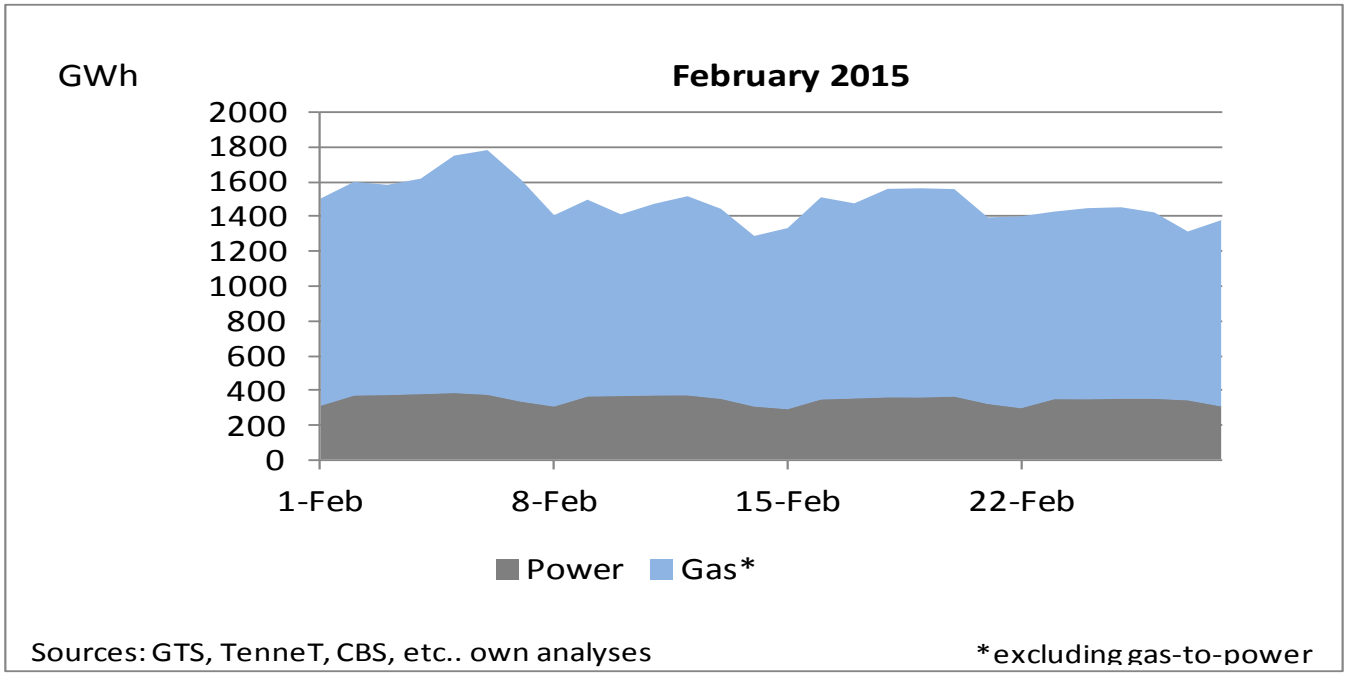

Daily power demand shows a typical week-weekend pattern. Daily gas demand (excluding the gas demand for power) is mainly used for the heating market and affected by ambient temperature.

Conventional Power Production February 2015

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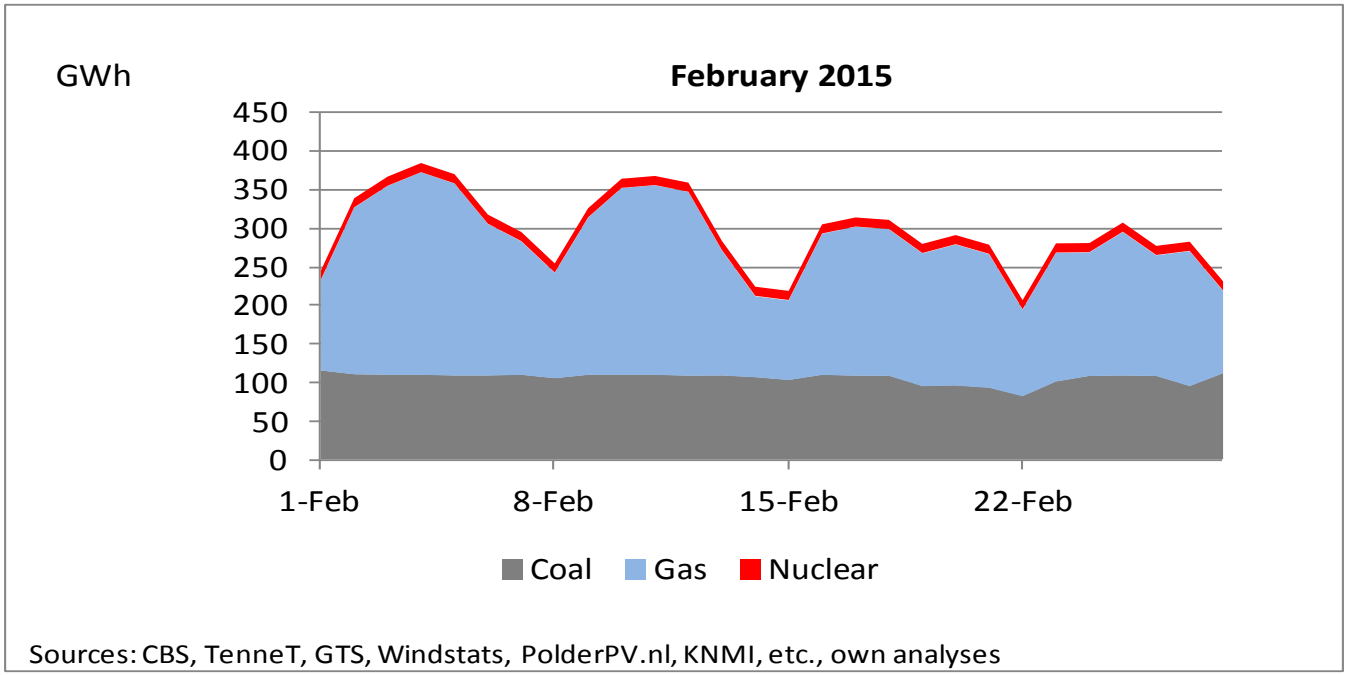

Sources: CBS, TenneT, GTS, Windstats, PolderPV.nl, KNMI, etc., own analyses

Daily conventional power generation peaked on February 3rd. This was a week with relative low wind production and low net power imports.

Wind and Solar Power Production February 2015

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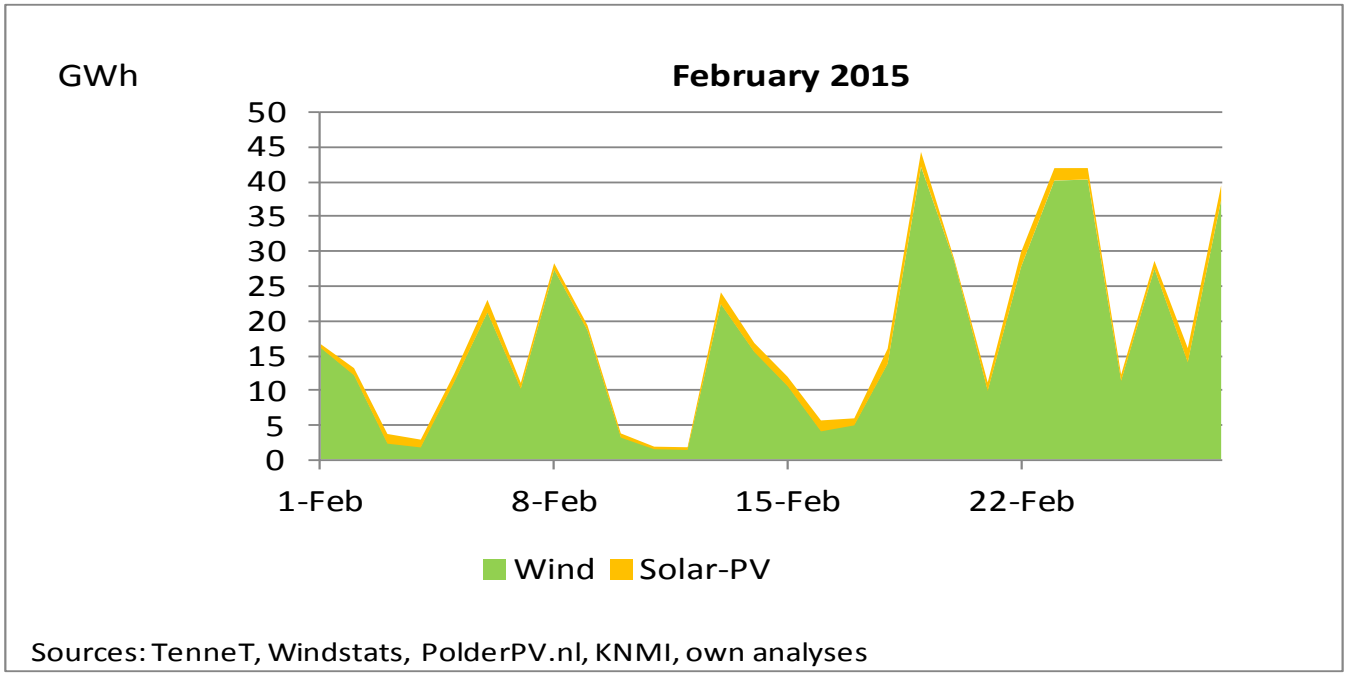

Sources: TenneT, Windstats, PolderPV.nl, KNMI, own analyses

February was a month with very low wind production. Although wind capacity increased by almost 10% compared to 2014, electricity generation in 2015 was 40% less. Solar PV is still low in February, but increased by 60% compared to 2014

1 GWh is sufficient to provide electricity for a year to 300 households

Contribution of Renewable Energy February 2015

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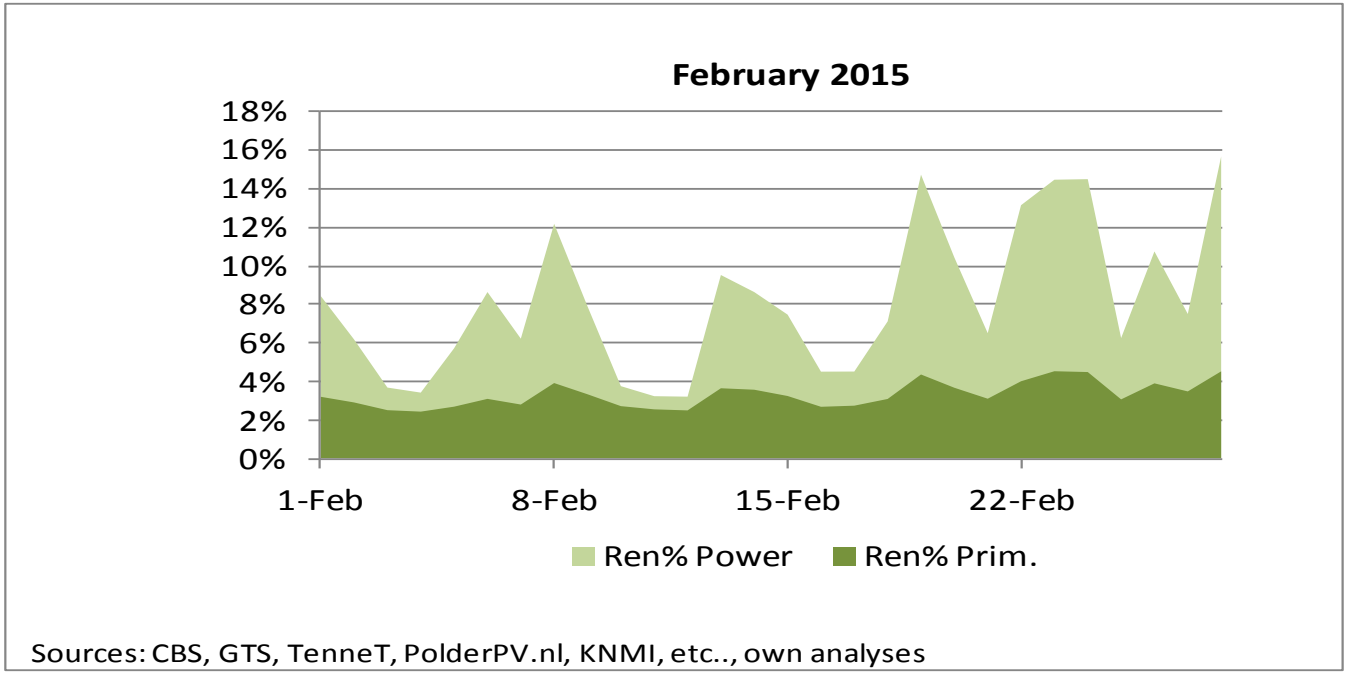

Sources: CBS, GTS, TenneT, PolderPV.nl, KNMI, etc.., own analyses

Renewable energy peaked in the second half of February to about 4%. The contribution of renewables was lower than in 2014 due to lower biomass and lower wind. The data provided have been calculated using the agreed EU method.

SELECTED MONTHLY ENERGY DATA

Gas Demand 2015 (and 2014)

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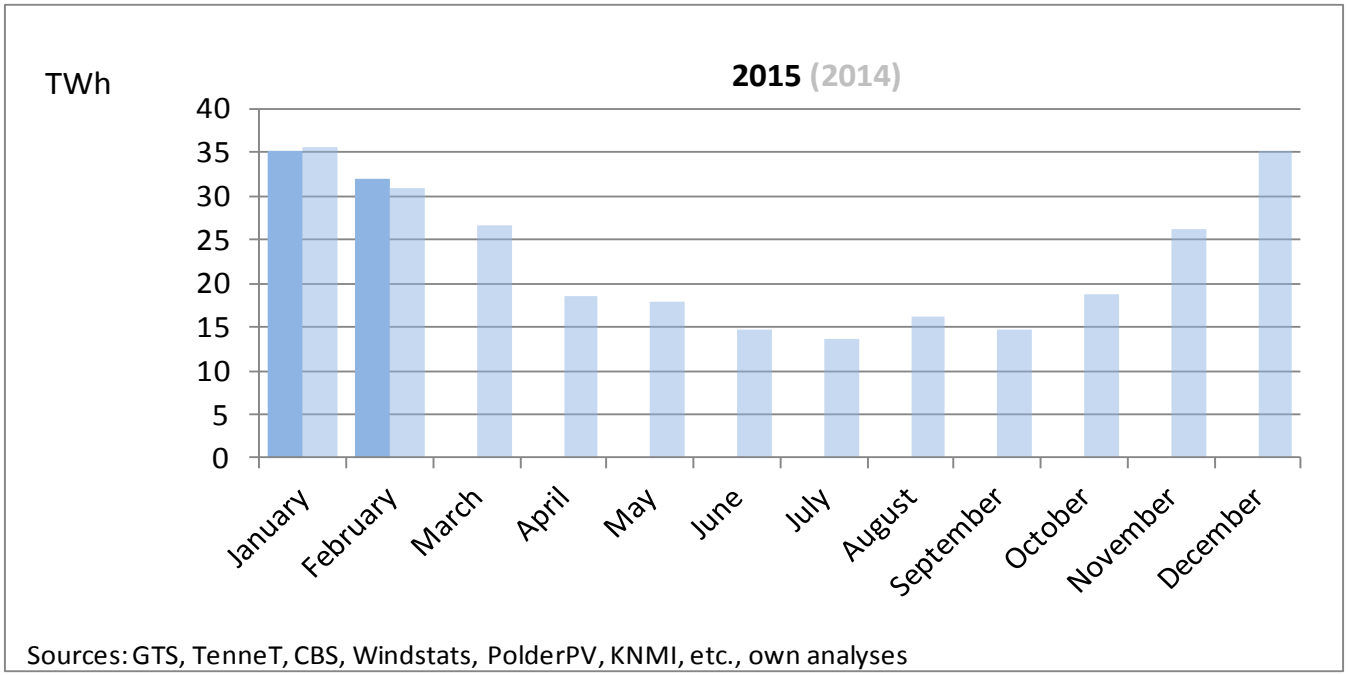
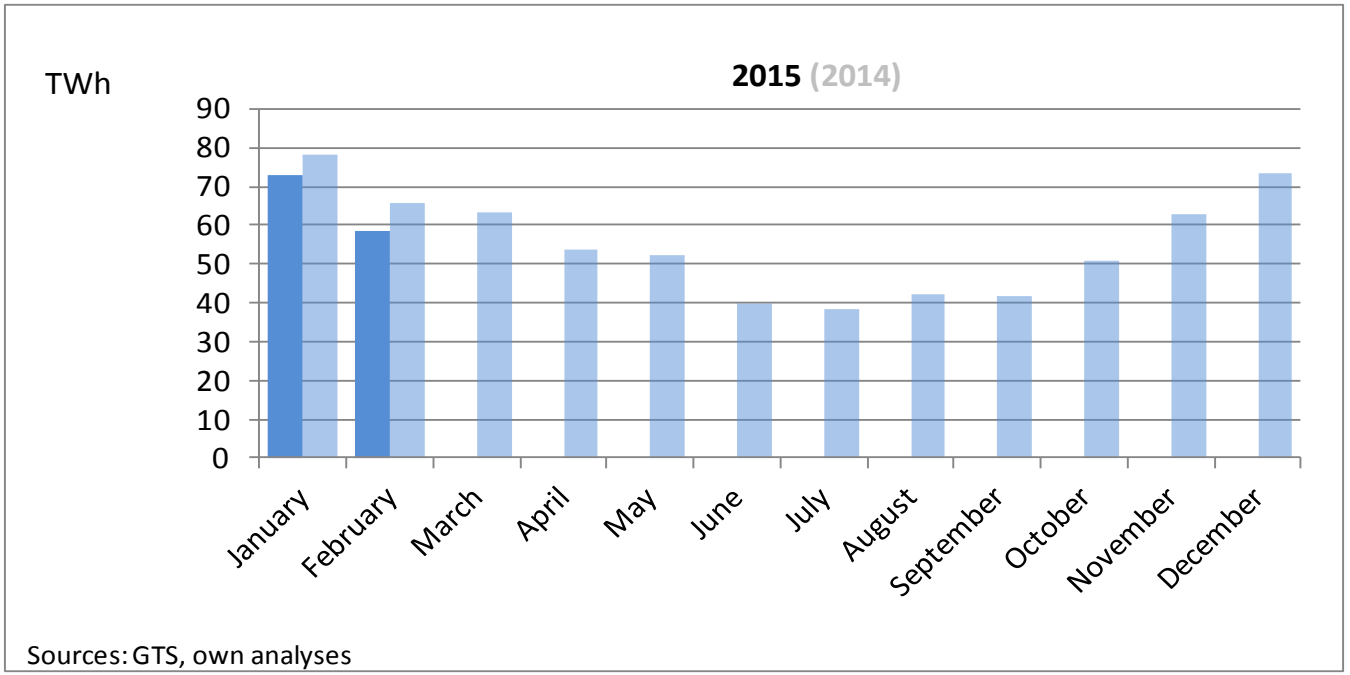


Sources: GTS, TenneT, CBS, Windstats, PolderPV, KNMI, etc., own analyses

In February 2015 gas demand (excluding gas demand for power production) was slightly higher than in February 2014.

Gas Production 2015 (and 2014)

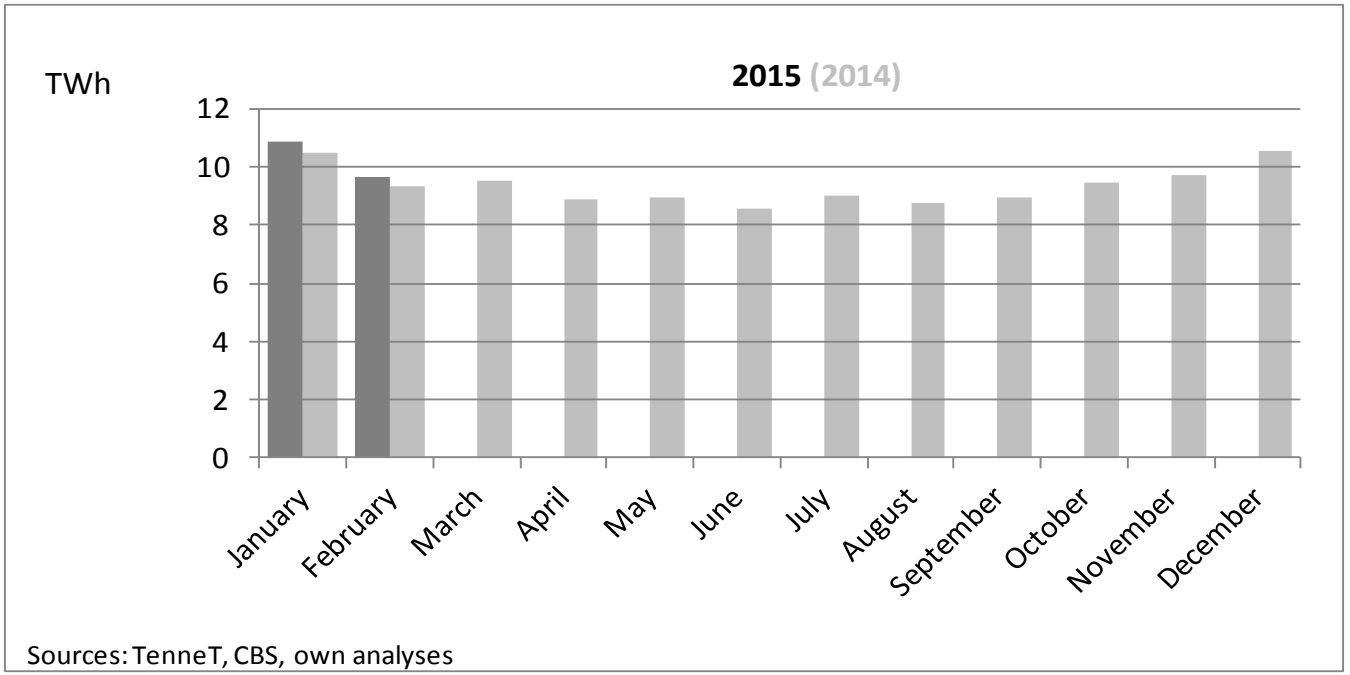


Sources: GTS, own analyses

In February 2015, Dutch gas production was 10% lower than in February 2014.

10 TWh of gas is sufficient to supply heat all houses in Amsterdam for two years

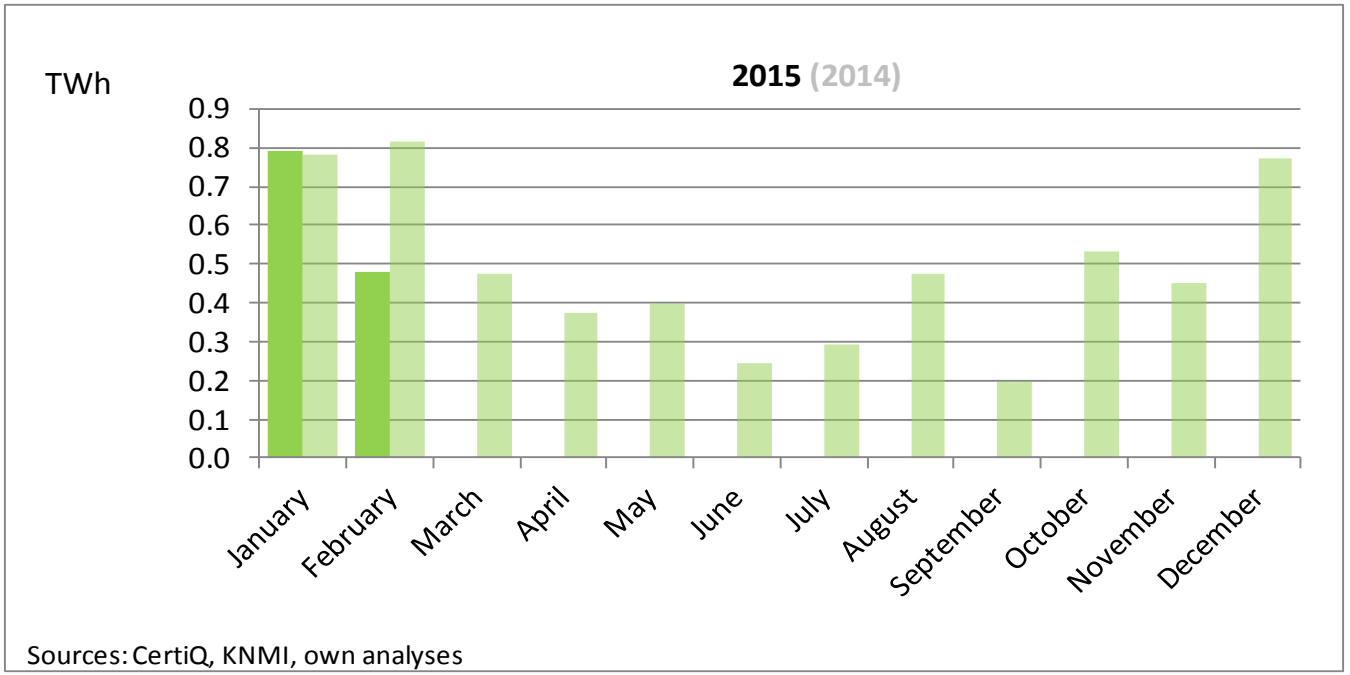
Power Demand 2015 (and 2014)



Sources: TenneT, CBS, own analyses

In February 2015, power demand was 4% higher than in February 2014

Wind Production 2015 (and 2014)



Sources: CertiQ, KNMI, own analyses

In February 2015, wind power generation was much lower than in February 2014, due to much lower wind availability

Solar PV Production 2015 (and 2014)

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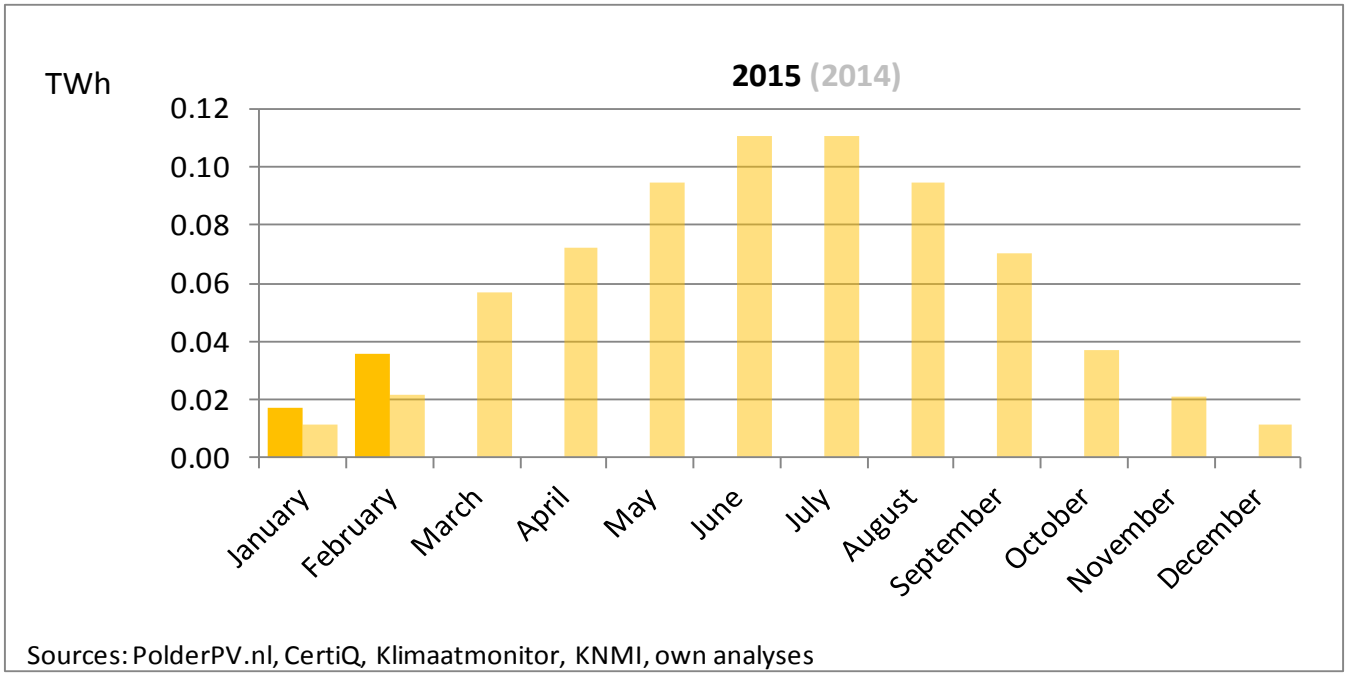

Sources: PolderPV.nl, CertiQ, Klimaatmonitor, KNMI, own analyses

In February 2015, Solar PV was low, but grew spectacular with 65% compared to February 2014, due to a significant increase of Solar PV capacity and more sunny weather.

Coal-to-Power 2015 (and 2014)

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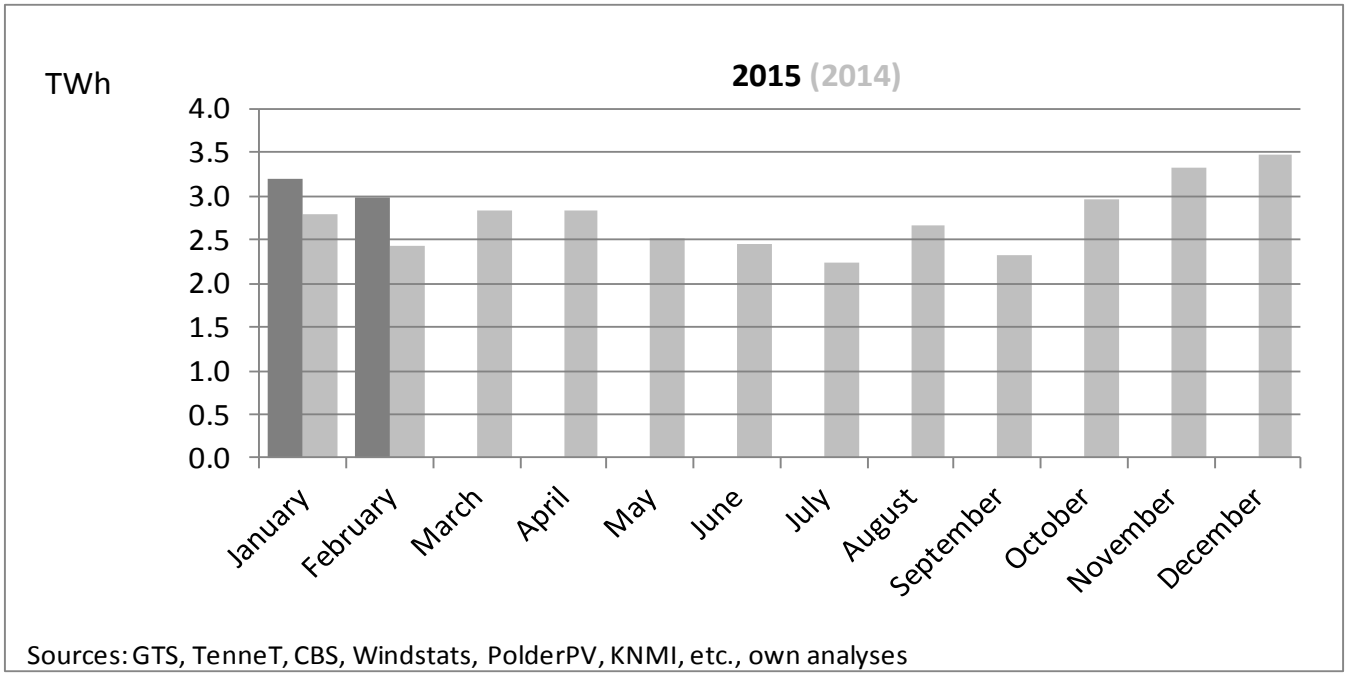
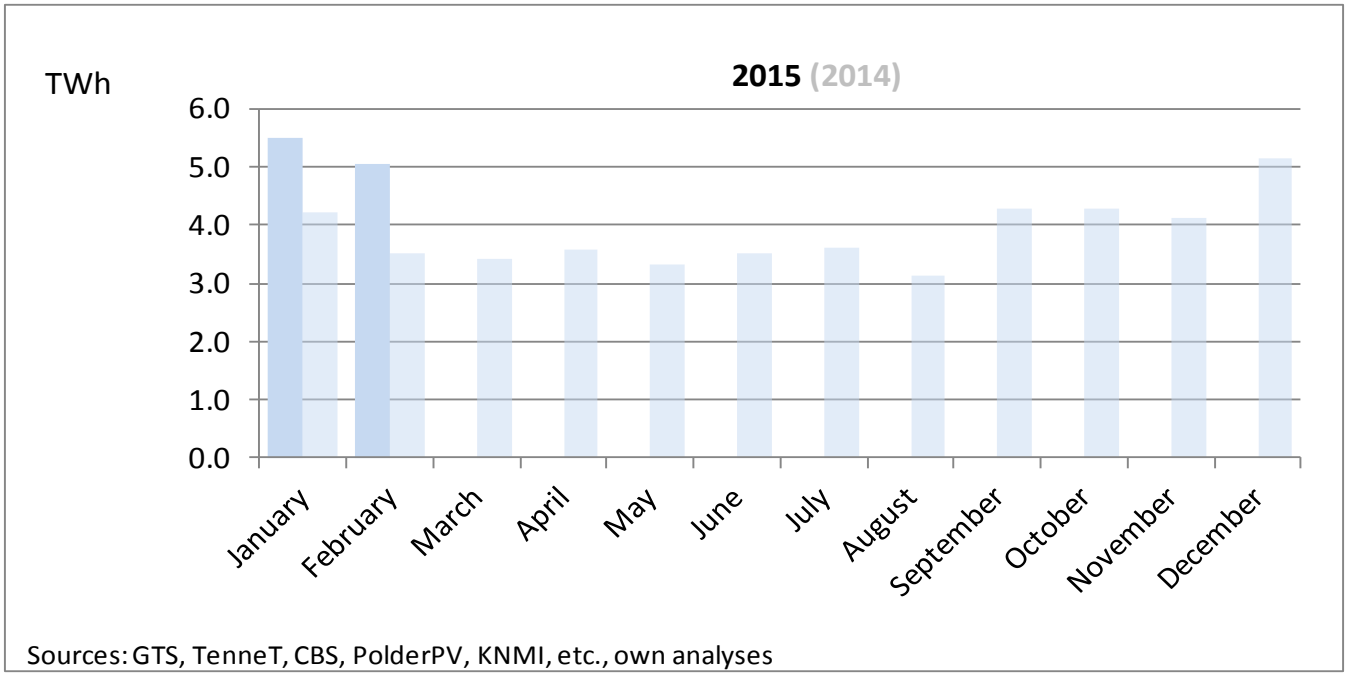


Sources: GTS, TenneT, CBS, Windstats, PolderPV, KNMI, etc., own analyses

Estimated power production by coal-fired power stations has increased by 23% compared to previous year. The coal demand for power generation is difficult to estimate because the status of the new coal-fired power stations is not publicly known.

Gas to Power
2015 (and 2014)

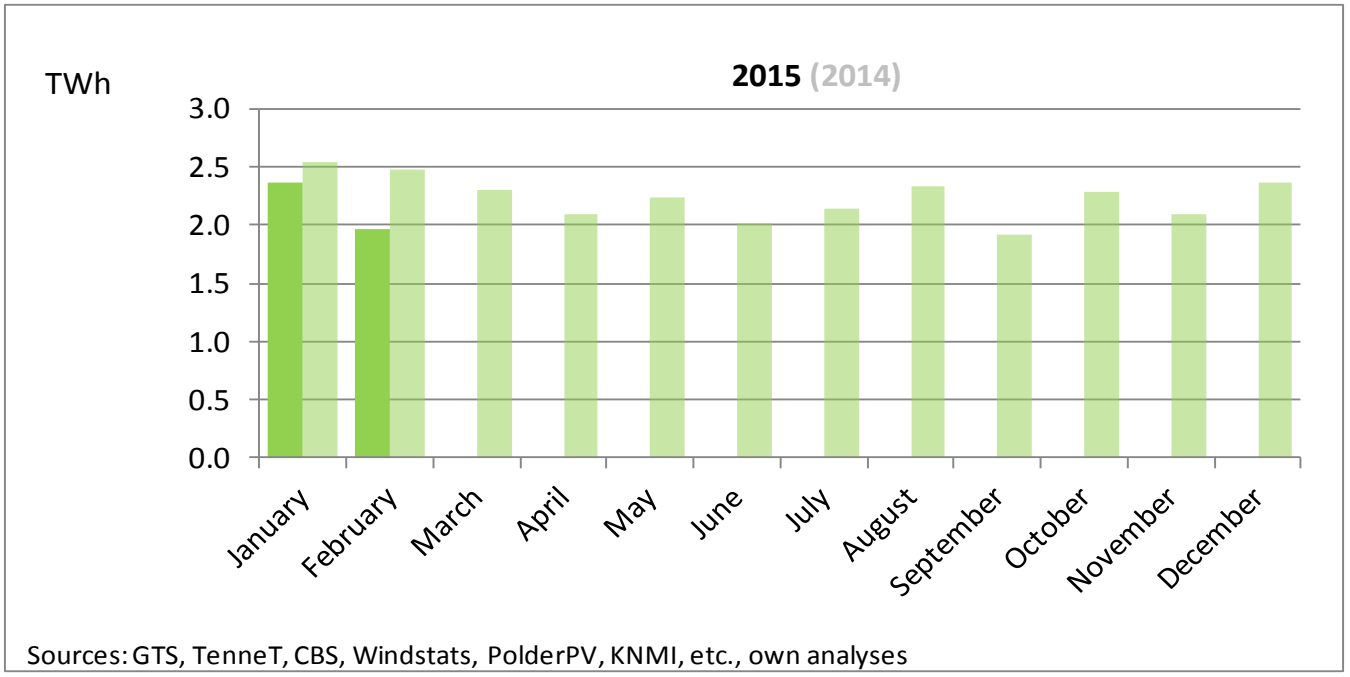


Sources: GTS, TenneT, CBS, PolderPV, KNMI, etc., own analyses

In February, estimated power production by gas-fired power stations and cogeneration has increased significantly compared to previous year.

Renewable Energy All Sources

2015 (and 2014)



Sources: GTS, TenneT, CBS, Windstats, PolderPV, KNMI, etc., own analyses

In February 2015, total renewable energy was less than in February 2014, due to lower contributions from biomass and wind.

Renewable Energy Percentage 2015 (and 2014)

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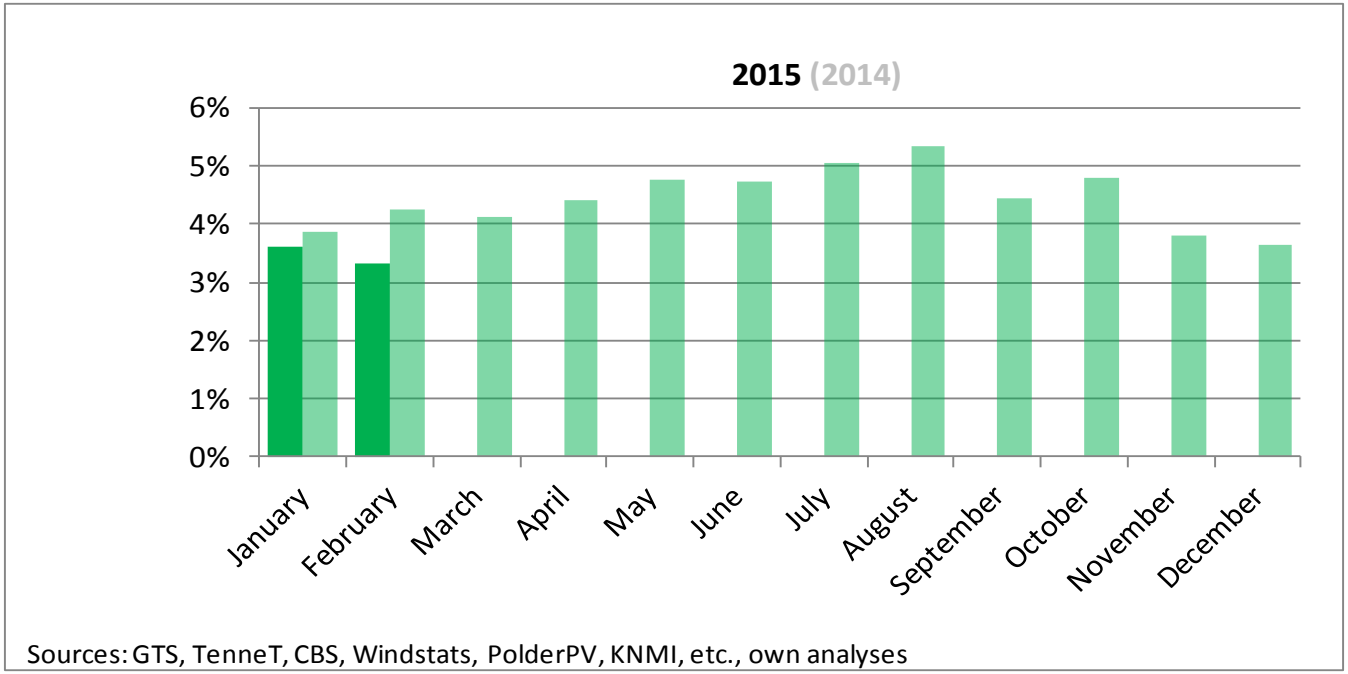
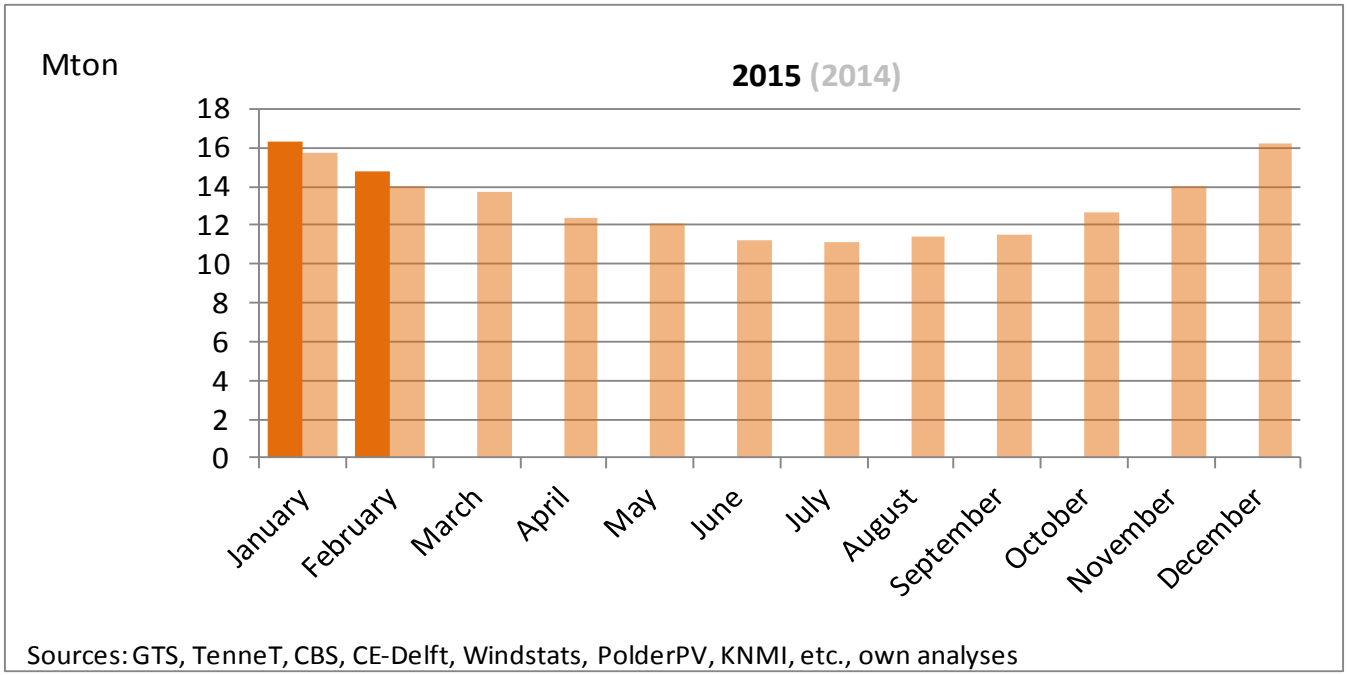


Sources: GTS, TenneT, CBS, Windstats, PolderPV, KNMI, etc., own analyses

In February 2015, the estimated national percentage of renewable energy as fraction of total energy demand (EU definition) has been estimated at just 3.3%.

CO2 Emissions 2015 (and 2014)



Sources: GTS, TenneT, CBS, CE-Delft, Windstats, PolderPV, KNMI, etc., own analyses

In February 2015, CO2 emissions are 5% higher than in February 2014. The main reason is that fossil power generation has been higher due to higher consumption, less imports and less renewable generation.

SELECTED HOURLY ENERGY DATA

Gas Supply
February 2015

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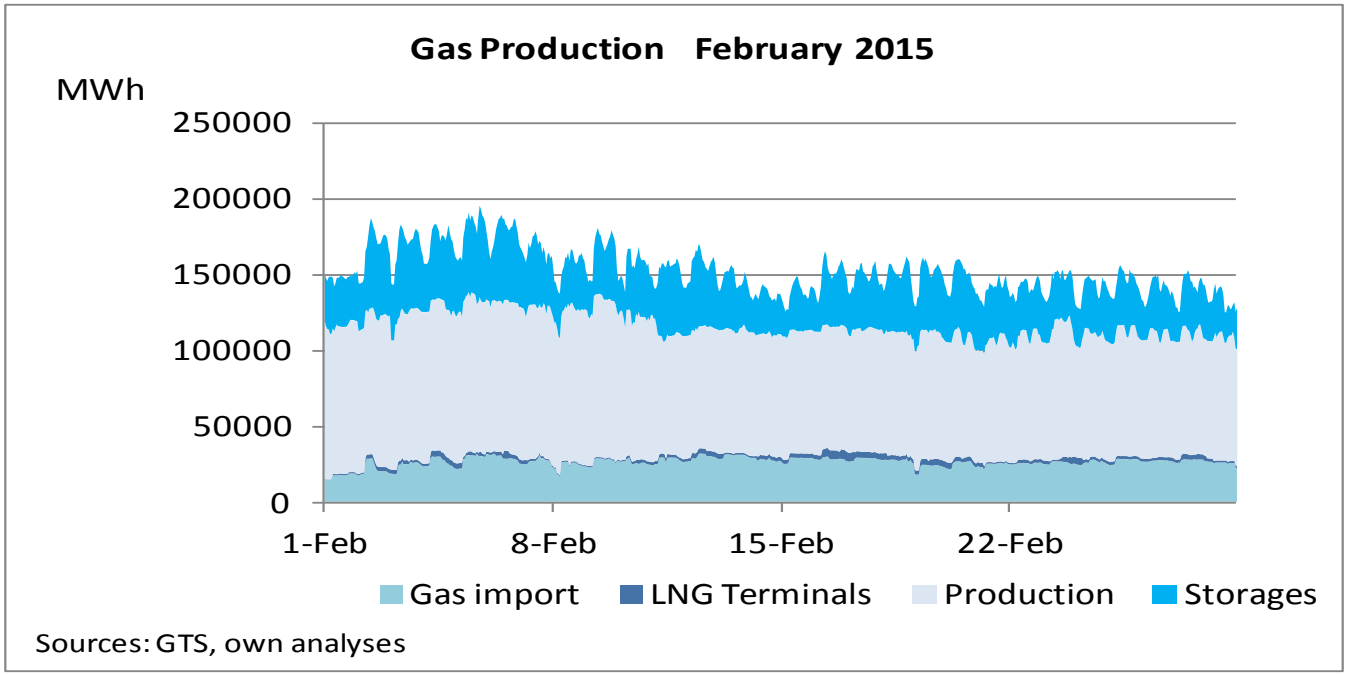

In February 2015, hourly gas production peaked at 190.000 MW (190 GW). Gas production decreased after February 10th, when Dutch Minister Kamp ordered a reduction of gas production from the large Groningen Gas Field

Gas Demand
Including Gas-to-Power
January 2015

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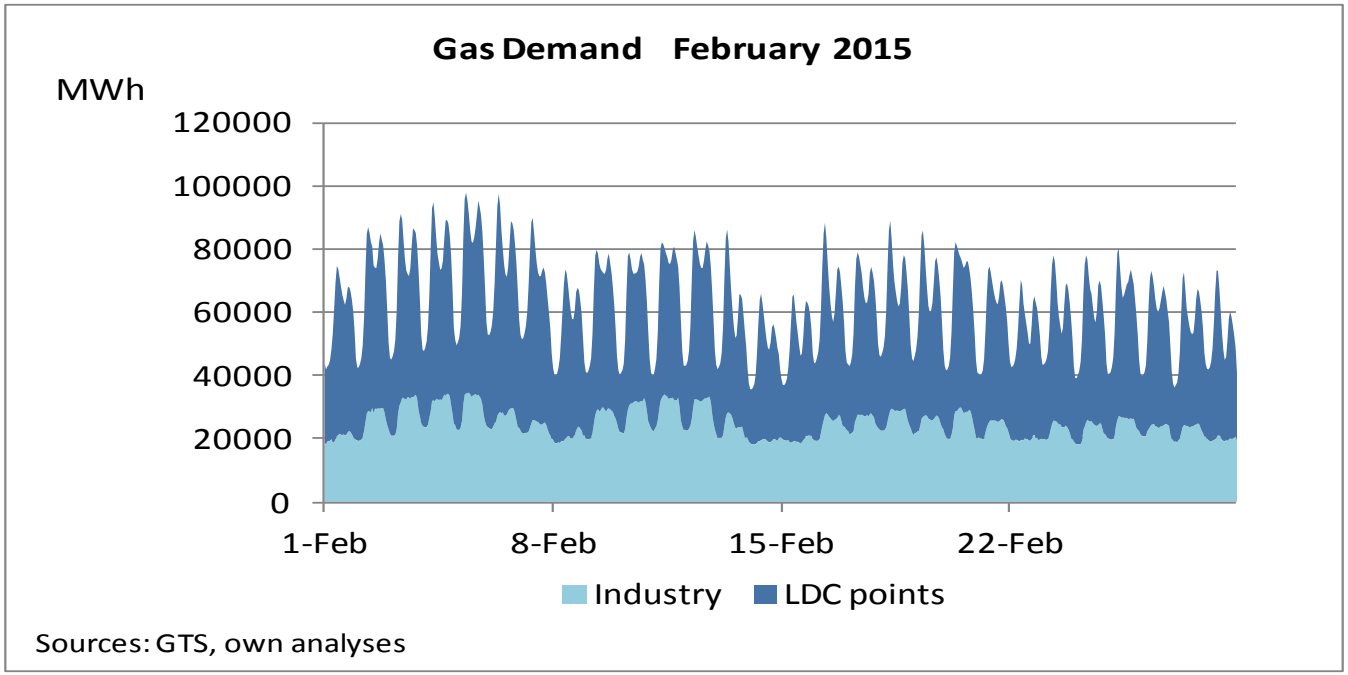
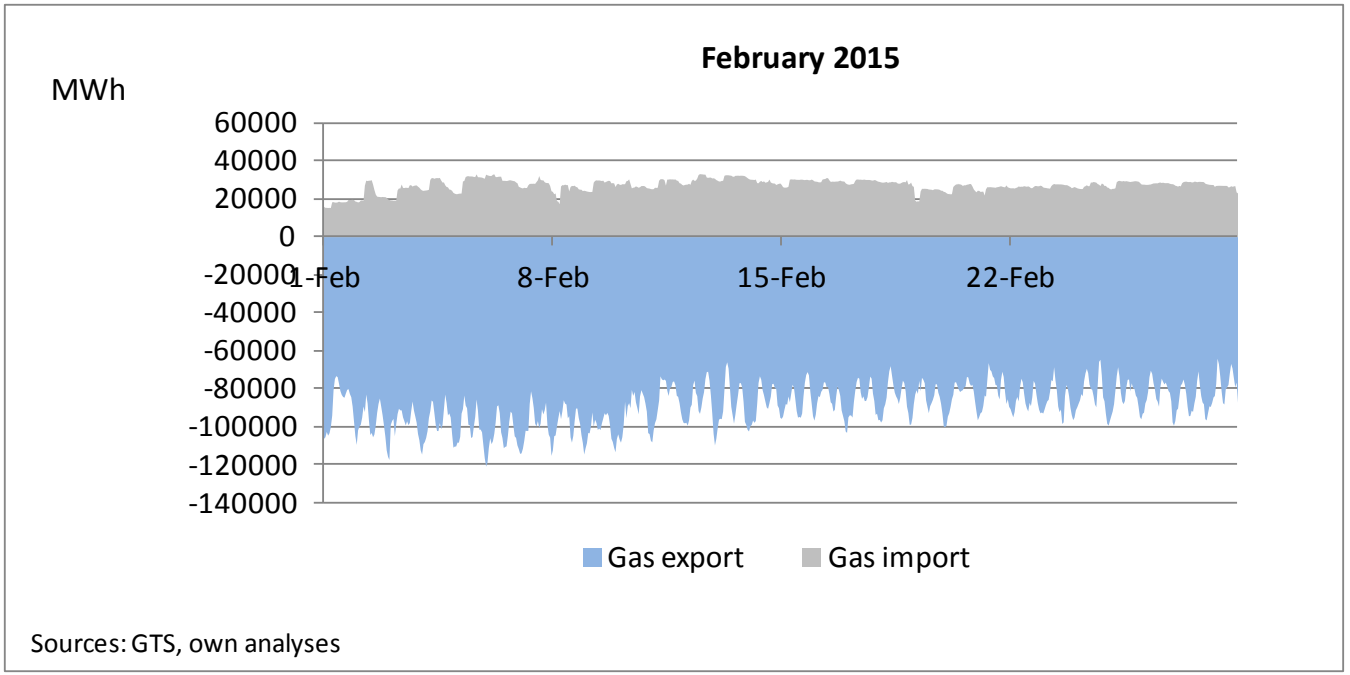


Sources: GTS, own analyses

On February 5th, gas demand in The Netherlands peaked to almost 100.000 MW (100 GW). The peak in gas demand has been caused by a combination of relatively low temperatures and high demand of gas for power generation.

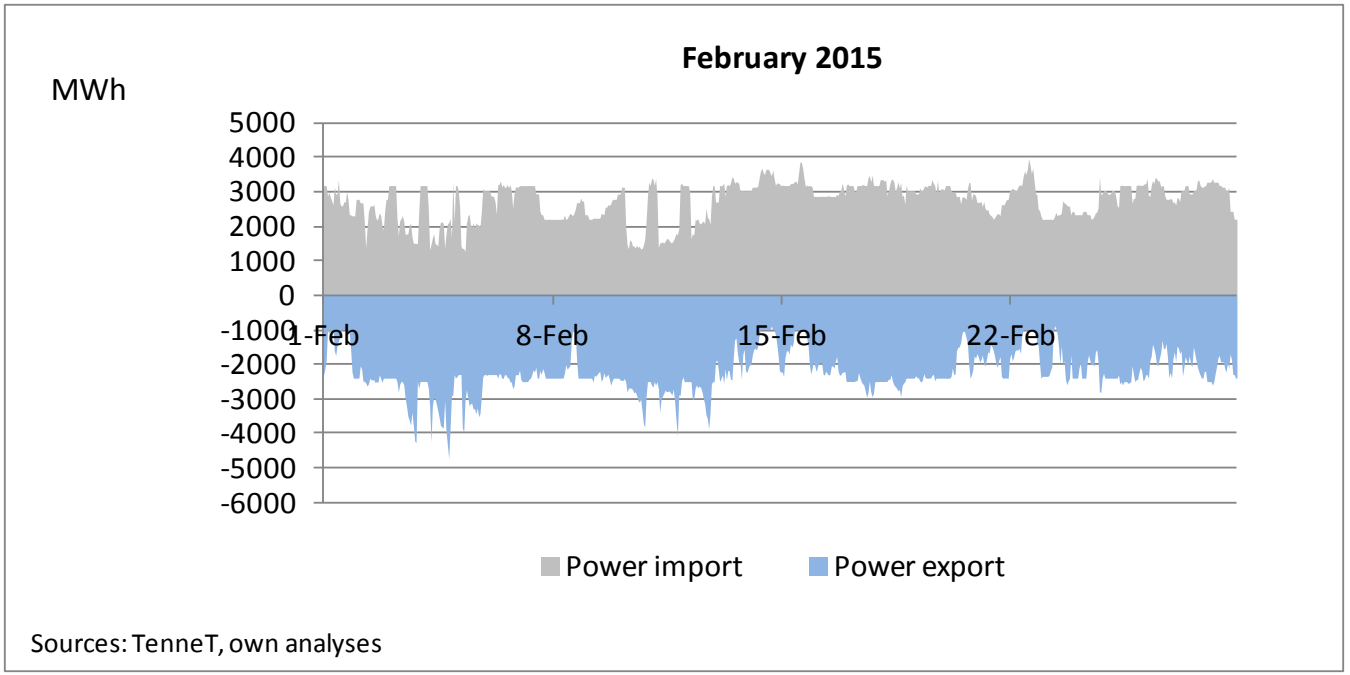
Gas Imports & Exports February 2015



Sources: GTS, own analyses

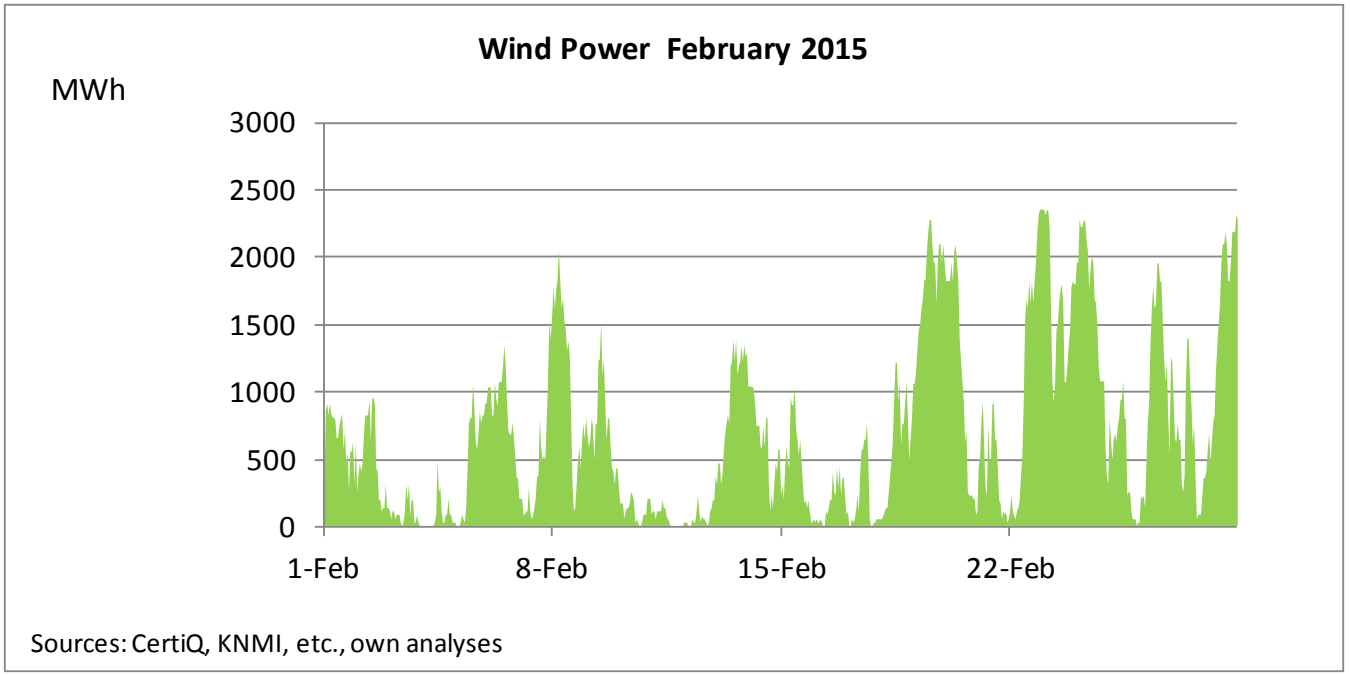
In February 2015, gas exports were 60 TWh, about 20% higher than previous year, Gas import added up to 18 TWh, similar to last year. Gas exports peaked in the beginning of February to 115.000 MW.

Power Imports & Exports February 2015



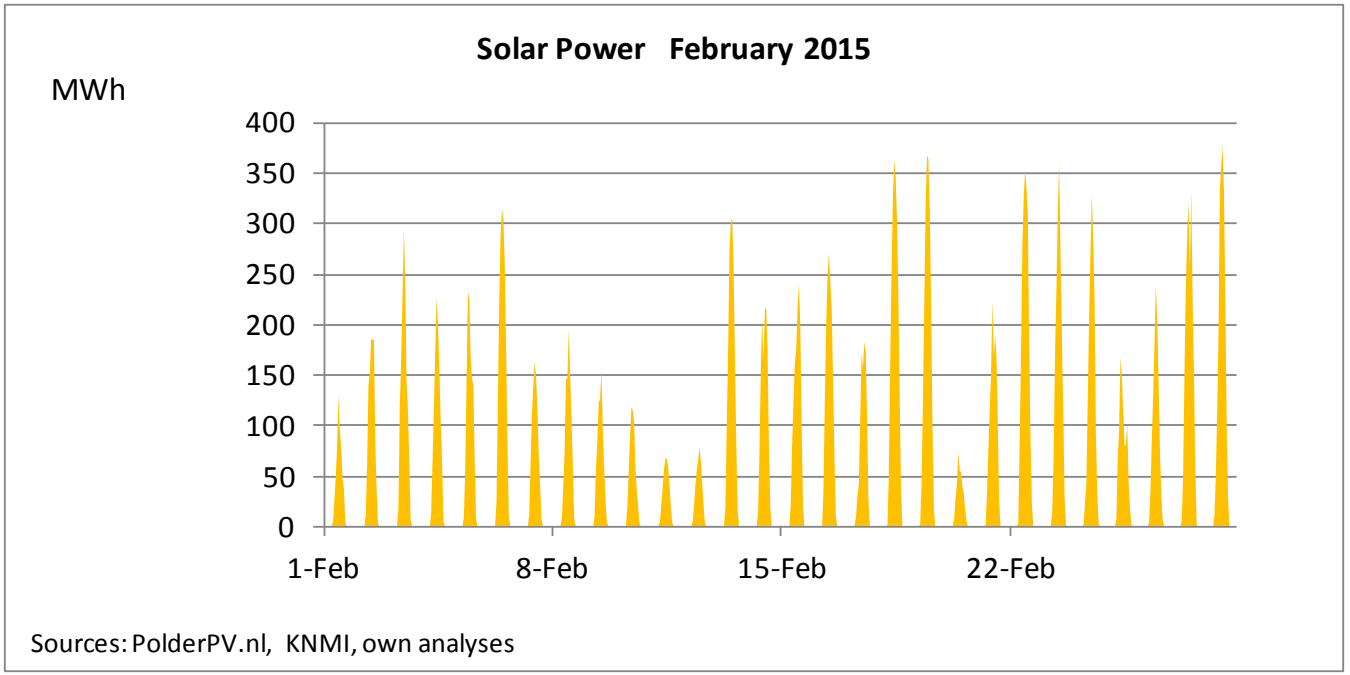
In February 2015, power imports 1.8TWh, almost equal to the exports of 1.5 TWh.

Wind Power February 2015



February 2015 was characterized by low wind availability. The average utilization rate of wind capacity was less than 25%, which is low for a month in winter.

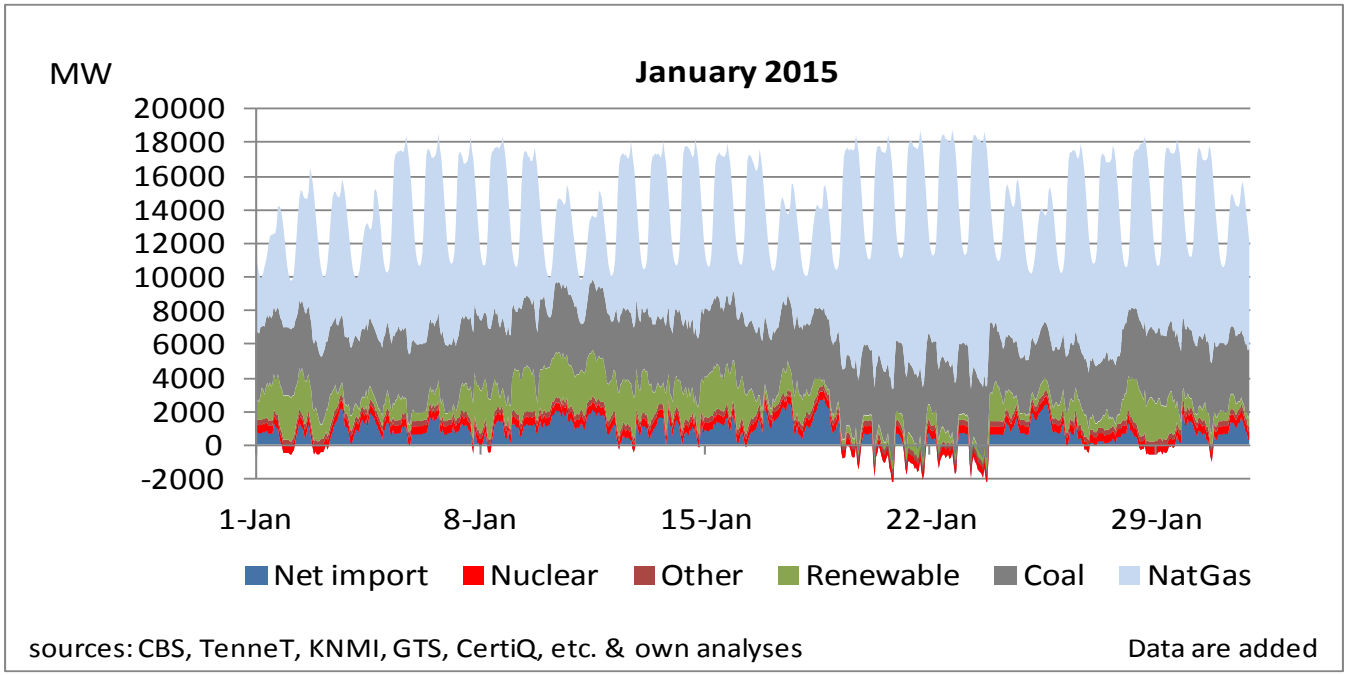
Solar PV Power February 2015



In February Solar-PV peaked to 360 MW, compared to 250 MW in January. This month, electricity by Solar Power was 65% higher than previous year.

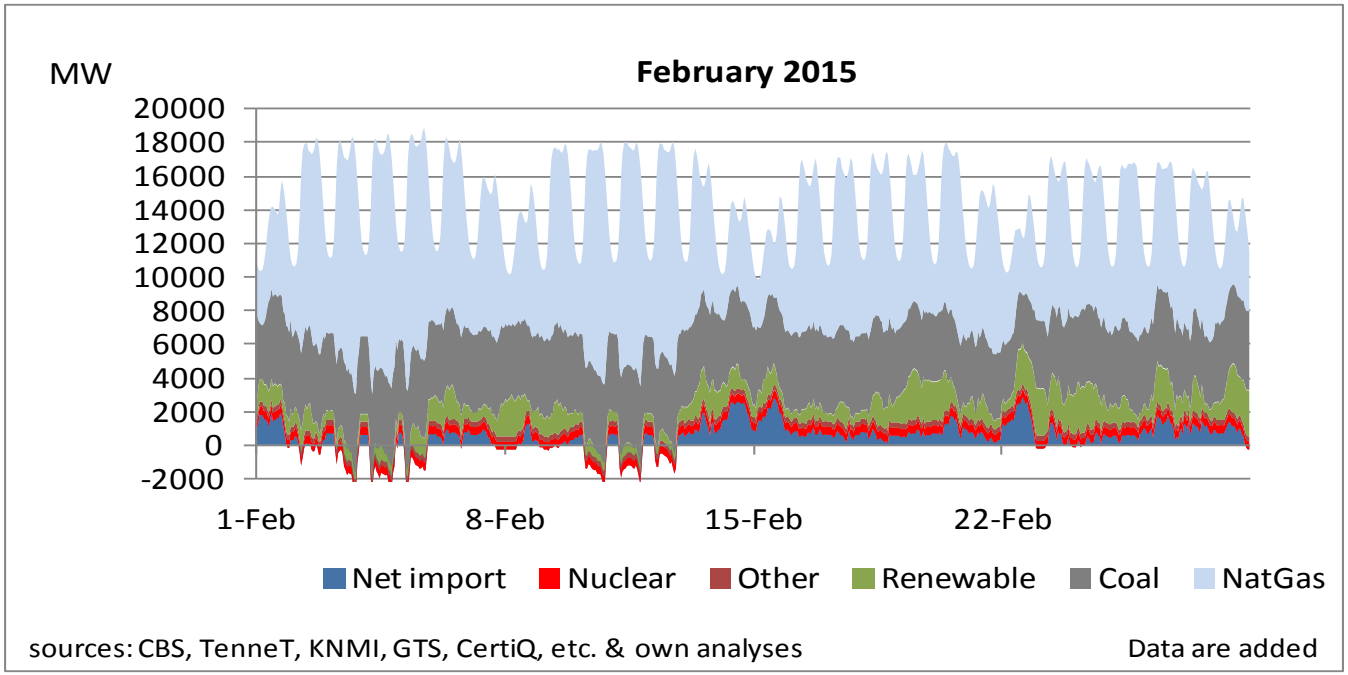
The following set of slides presents for each month in 2015 the hourly contributions of various energy sources to total power consumption in The Netherlands.

Power Generation January 2015



In the week of 20-24 January, power generation peaked, due to the net exports that occurred. The majority of the additional power generation has been generated by gas-fired installations.

Power Generation February 2015



Like in January, low wind availability coincided with net exports of power.

The following set of slides presents for each week in 2015 the hourly contributions of wind and solar-PV to the total power consumption in The Netherlands.

Hourly Solar-PV and Wind Generation 2015

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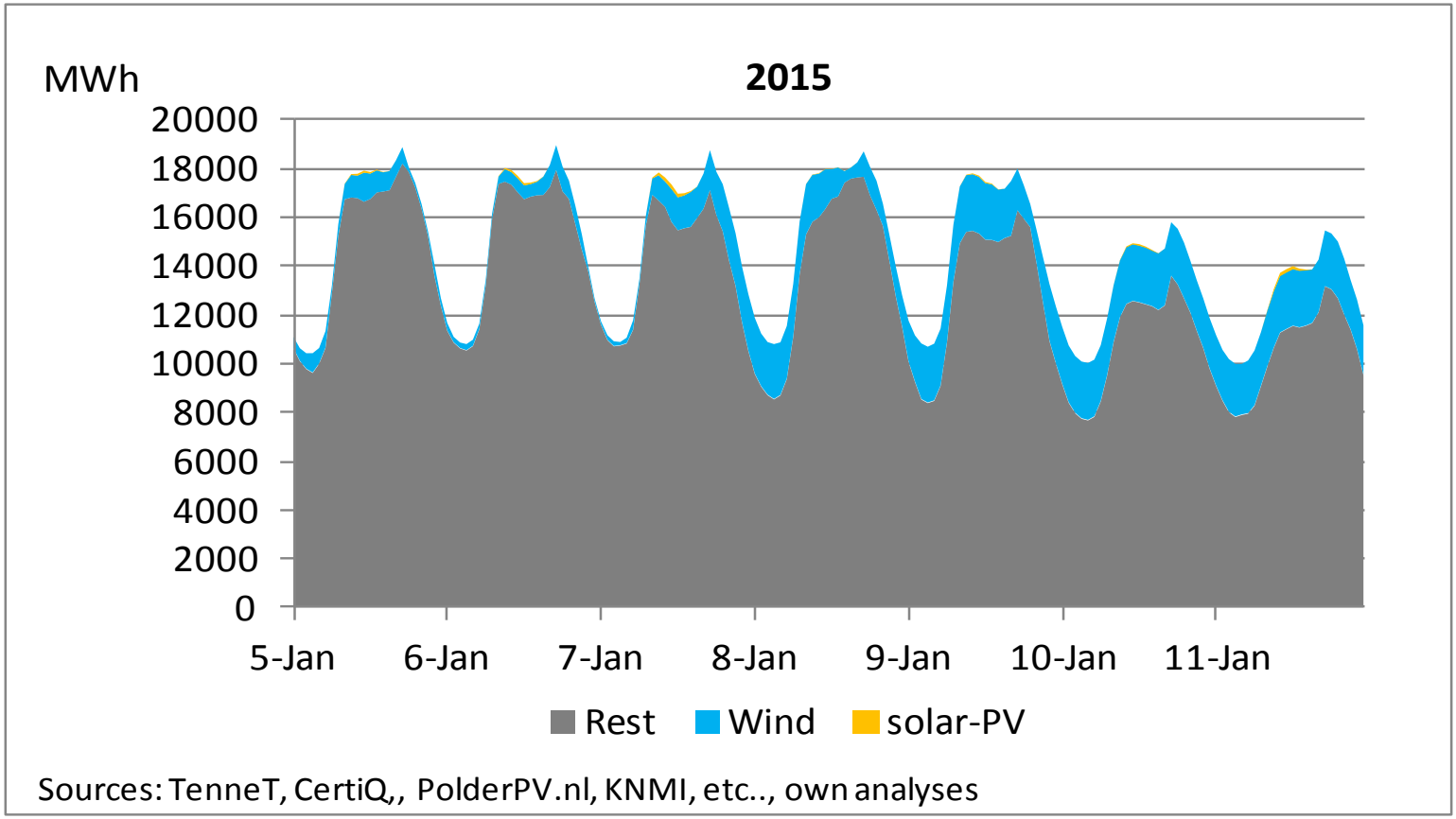

Sources: TenneT, CertiQ,, PolderPV.nl, KNMI, etc.., own analyses

Hourly Solar-PV and Wind Generation 2015

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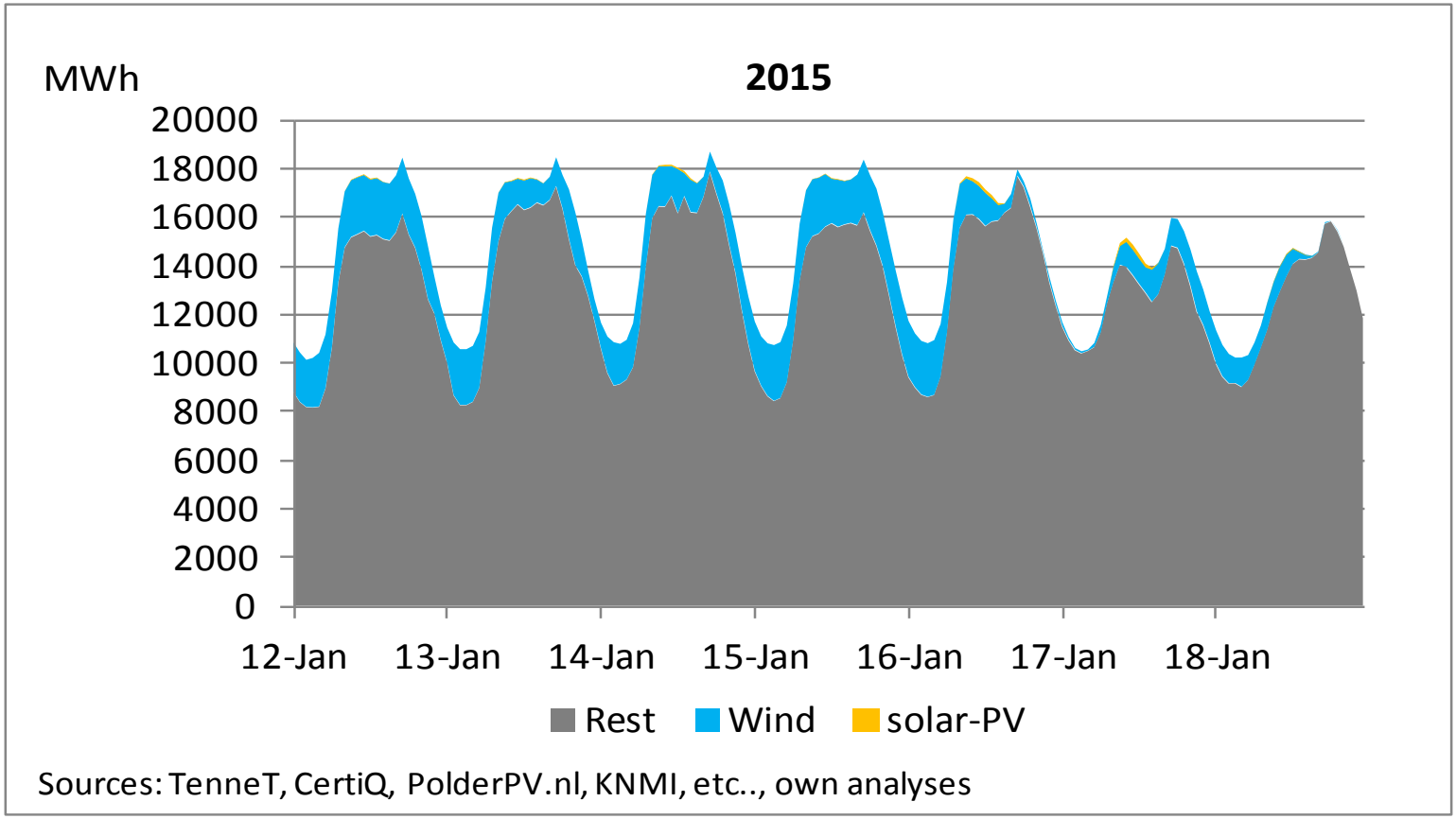

Sources: TenneT, CertiQ, PolderPV.nl, KNMI, etc.., own analyses

Hourly Solar-PV and Wind Generation 2015

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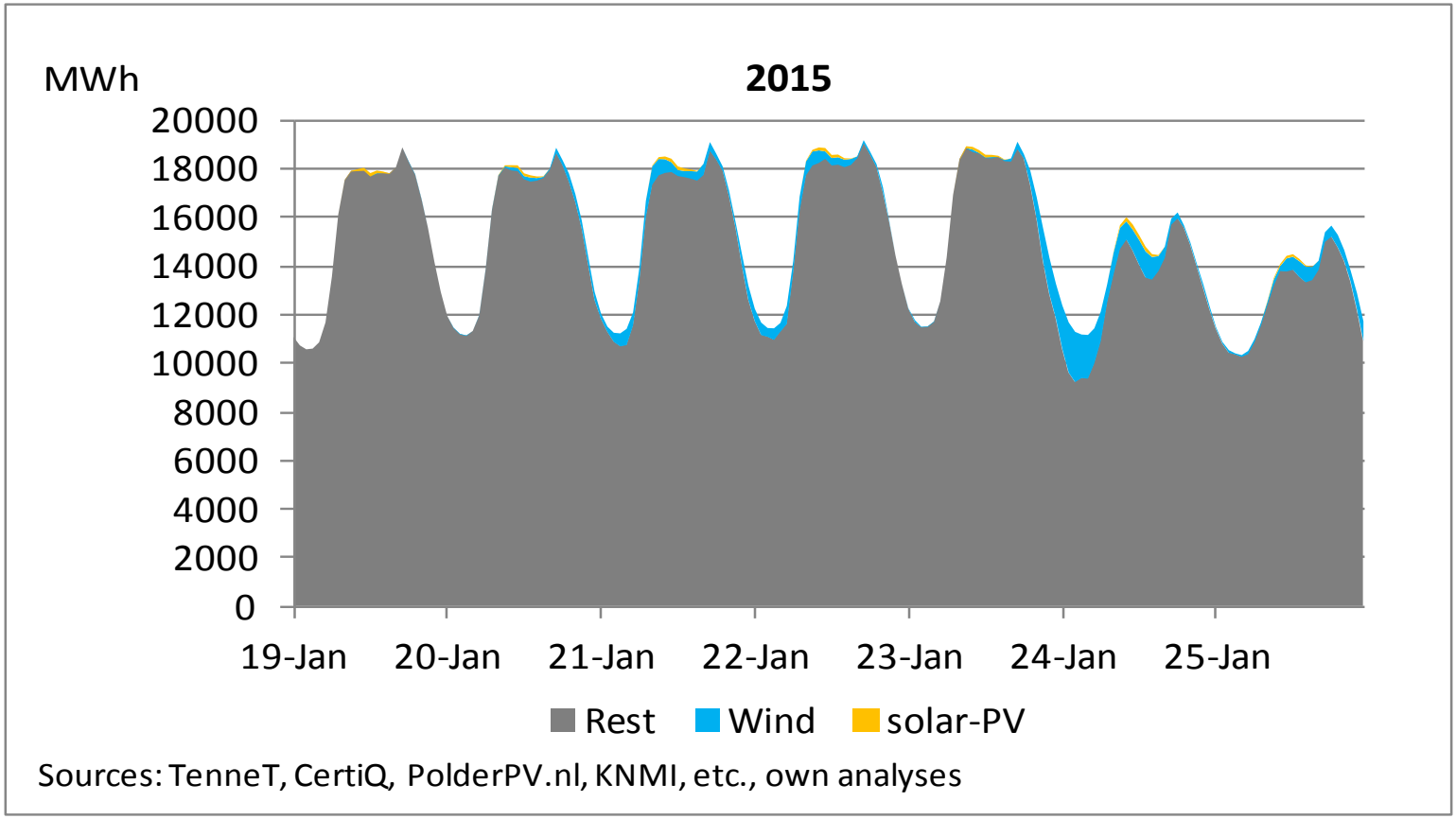

Sources: TenneT, CertiQ, PolderPV.nl, KNMI, etc., own analyses

Hourly Solar-PV and Wind Generation 2015

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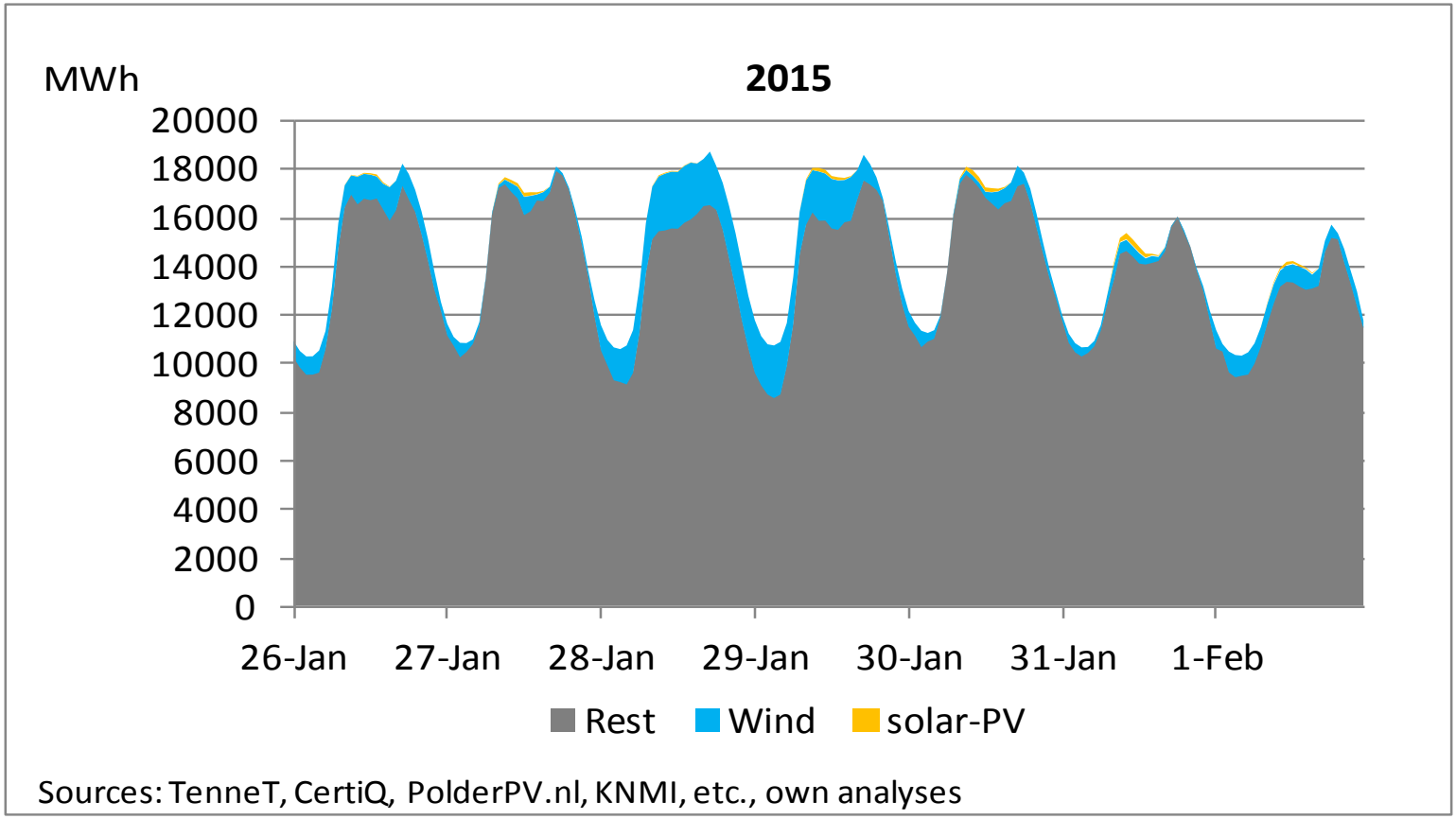

Sources: TenneT, CertiQ, PolderPV.nl, KNMI, etc., own analyses

Hourly Solar-PV and Wind Generation 2015

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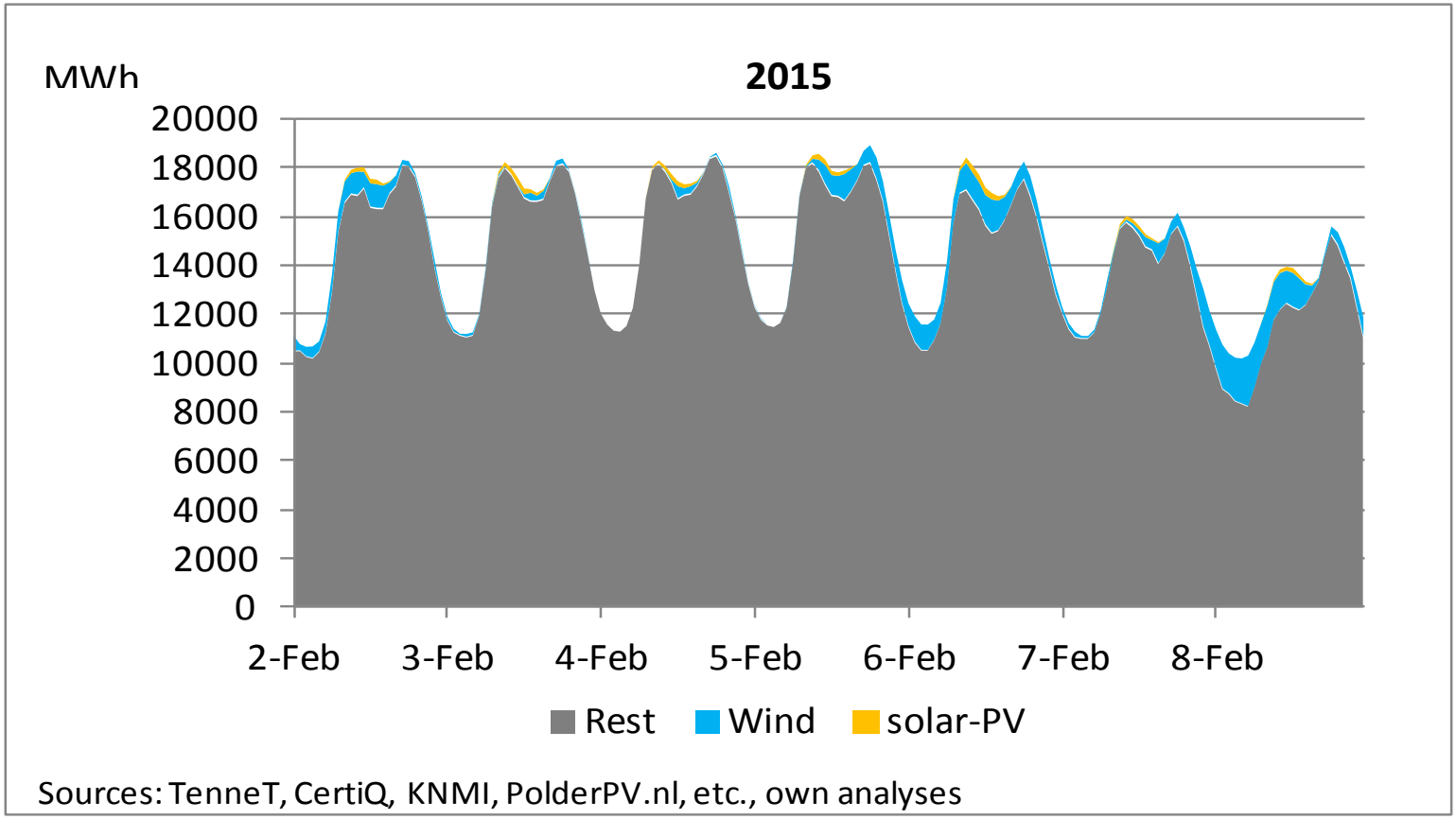

Sources: TenneT, CertiQ, KNMI, PolderPV.nl, etc., own analyses

Hourly Solar-PV and Wind Generation 2015

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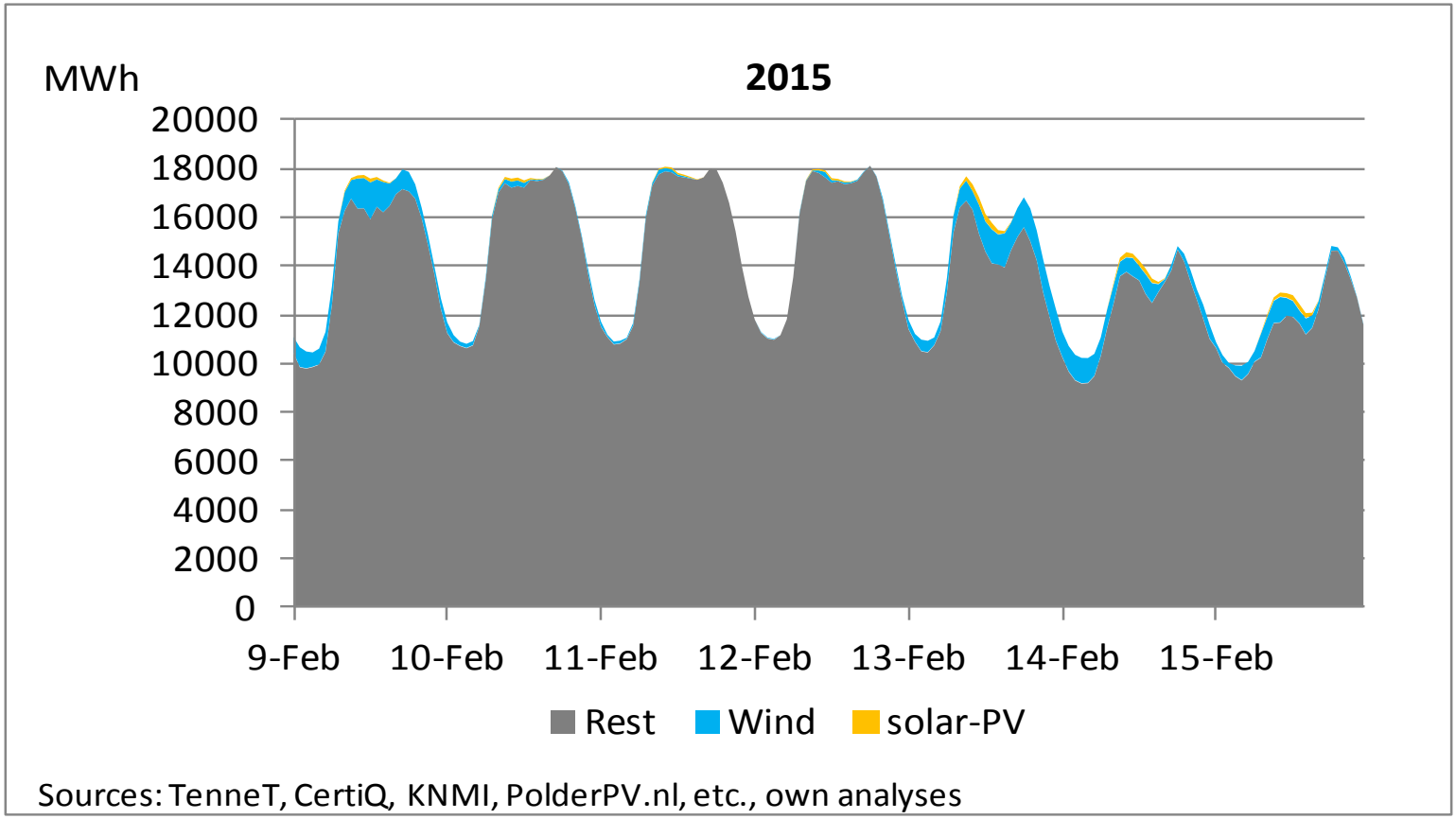

Sources: TenneT, CertiQ, KNMI, PolderPV.nl, etc., own analyses

Hourly Solar-PV and Wind Generation 2015

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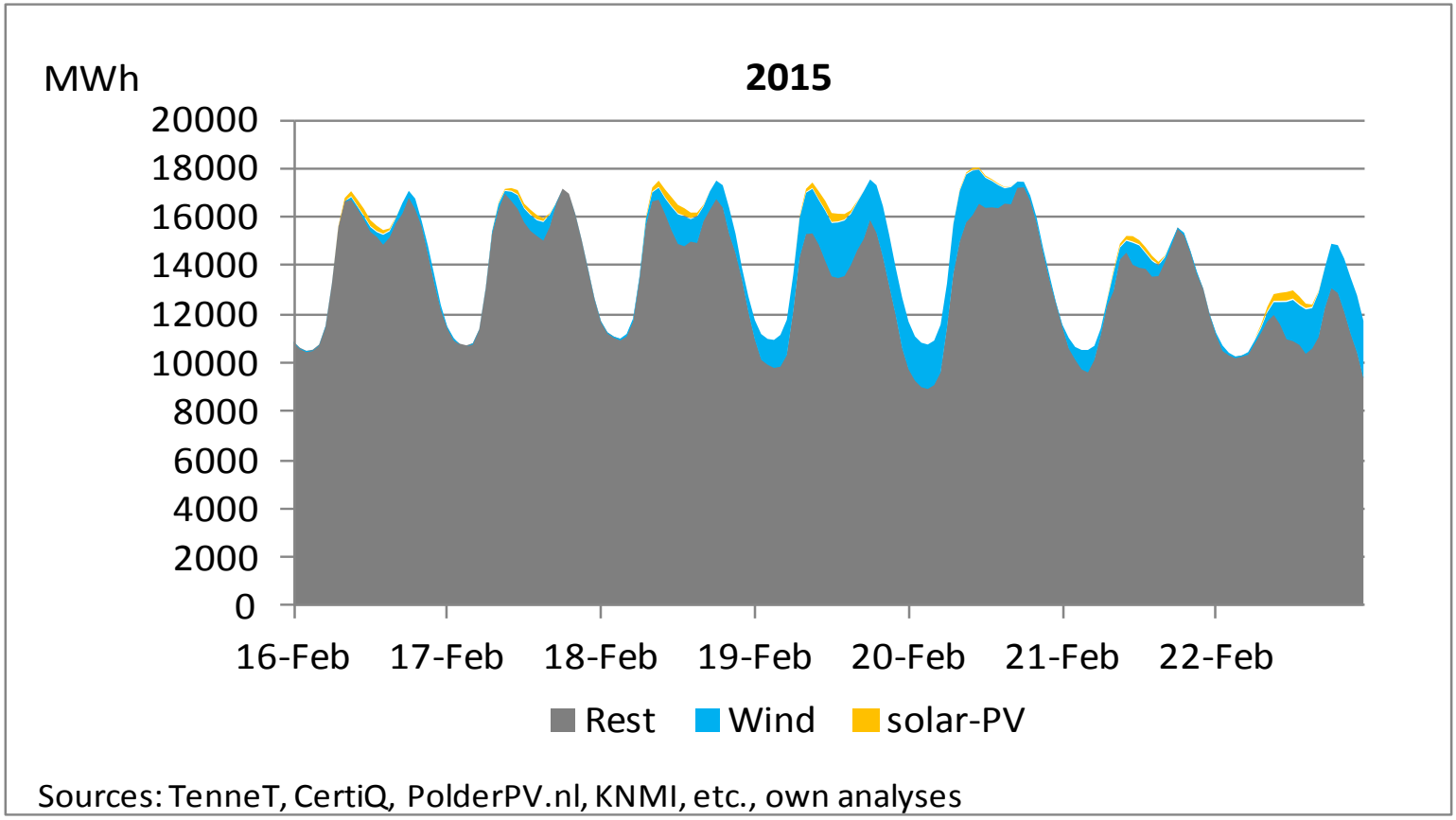

Sources: TenneT, CertiQ, PolderPV.nl, KNMI, etc., own analyses

Hourly Solar-PV and Wind Generation 2015

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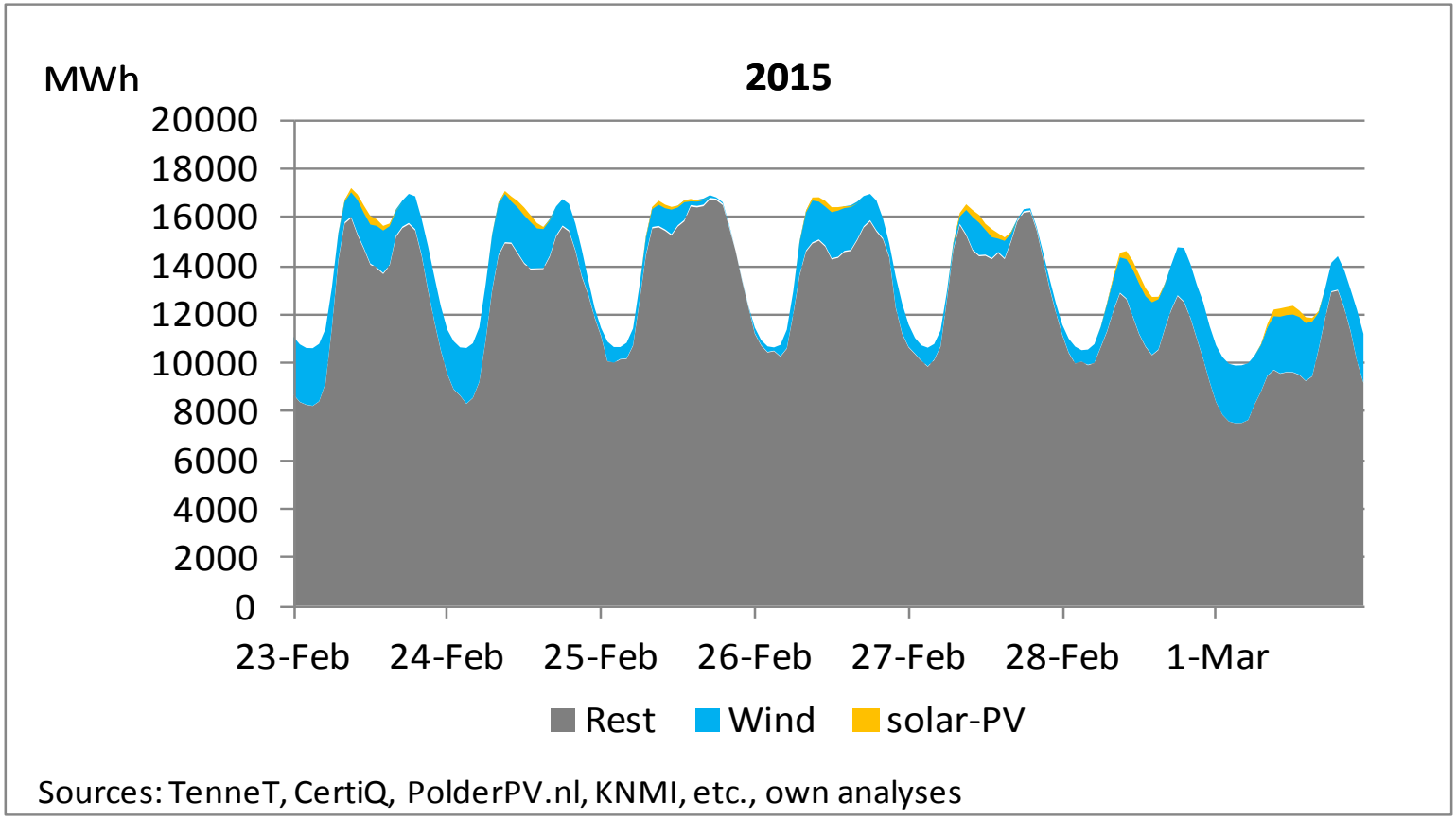
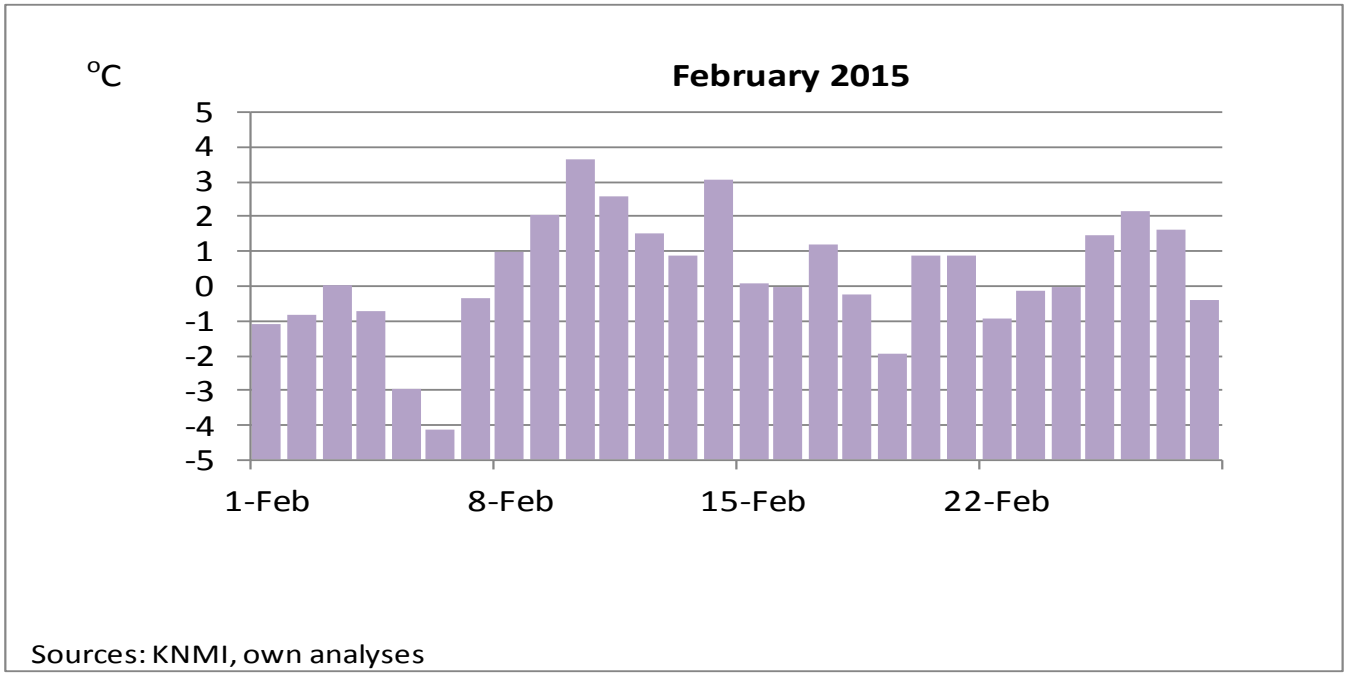


Sources: TenneT, CertiQ, PolderPV.nl, KNMI, etc., own analyses

MISCELLANEOUS

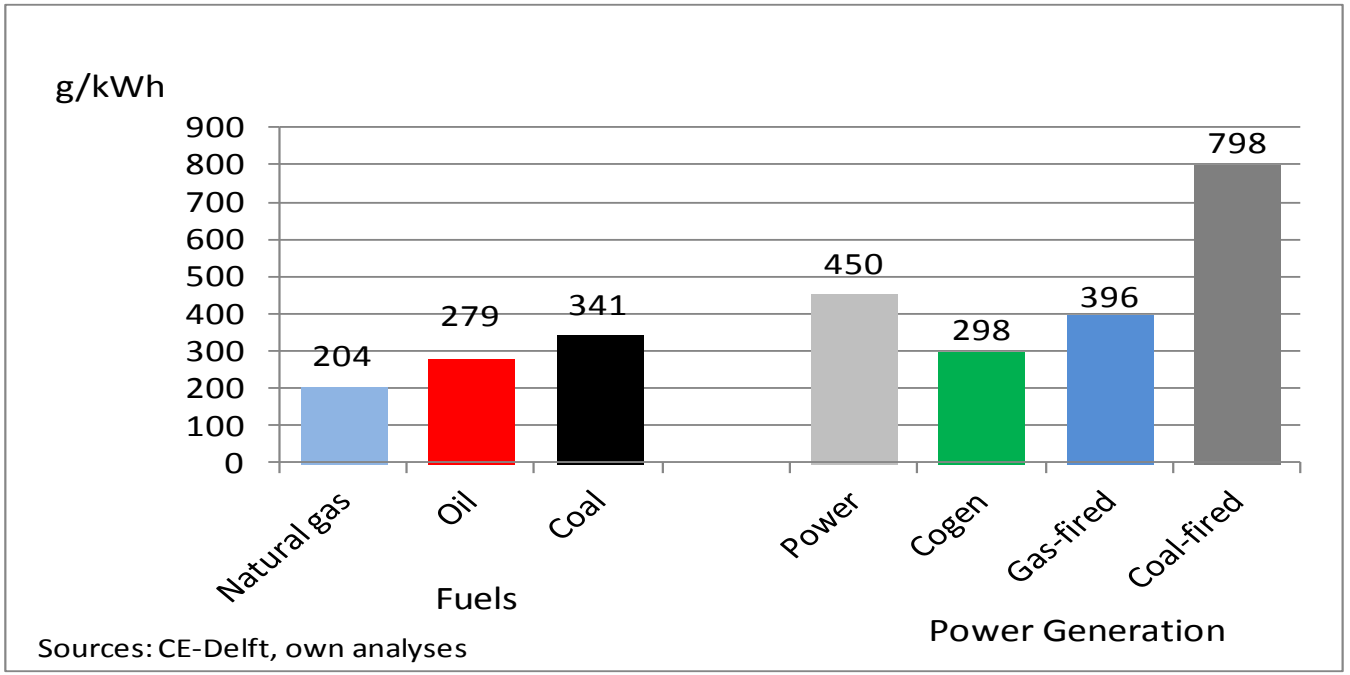
Effective Temperature February 2015



Sources: KNMI, own analyses

The effective temperature (temperature including wind shield factor) in February 2015.

Fuel Specific CO2 Emissions



Characteristic CO2 emissions used in this presentation.

Epilogue

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ENERGY TRANSITION CENTRE

This presentation is based on numerous sources which present data on energy demand and supply in The Netherlands. These data, however, do not cover the entire energy system. Some approximations and scaling factors were thus needed. The author would like to thank students from Hanze University of Applied Science in Groningen and various energy experts in The Netherlands which gave suggestions for improvements of the methods used. Currently, the aggregated results of this work are in good agreement with data supplied by the Dutch National Office of Statistics (CBS). It is believed by the author that the detailed results in this presentation give a fair presentation of the complex reality of the Dutch energy system.

Nevertheless, the author invites readers to comment on the data provided with the objective to further improve this work. After all, good and reliable data are at the heart of any successful policy to make our world more sustainable.